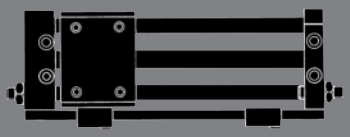
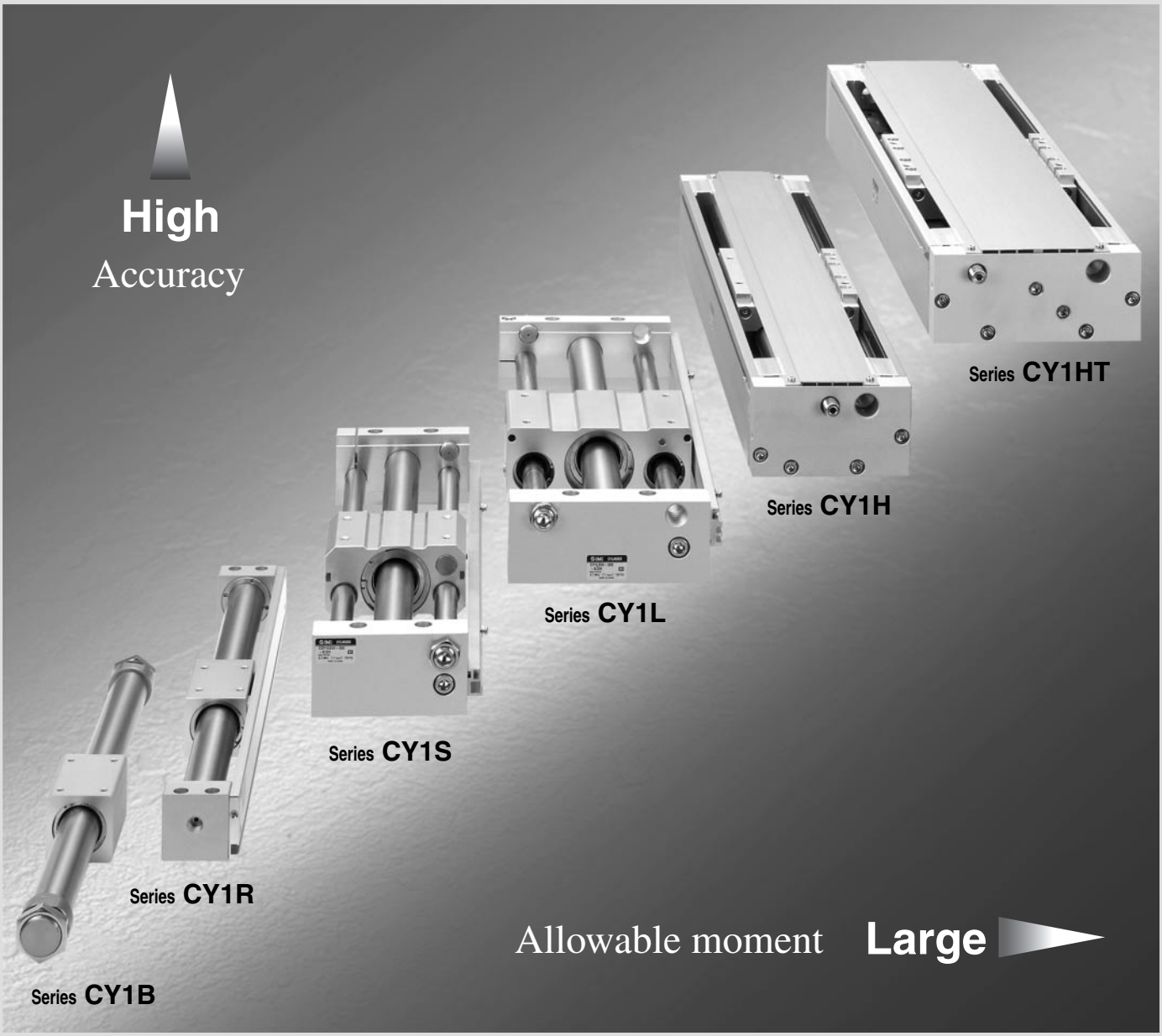


# Magnetically Coupled Rodless Cylinder

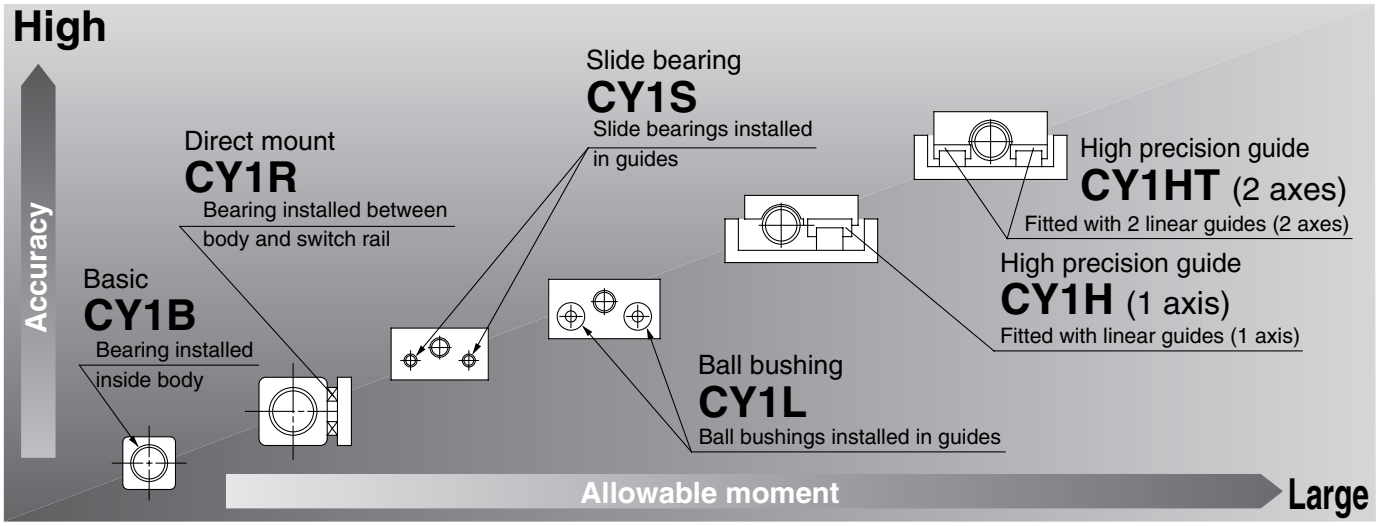
# Series CY1

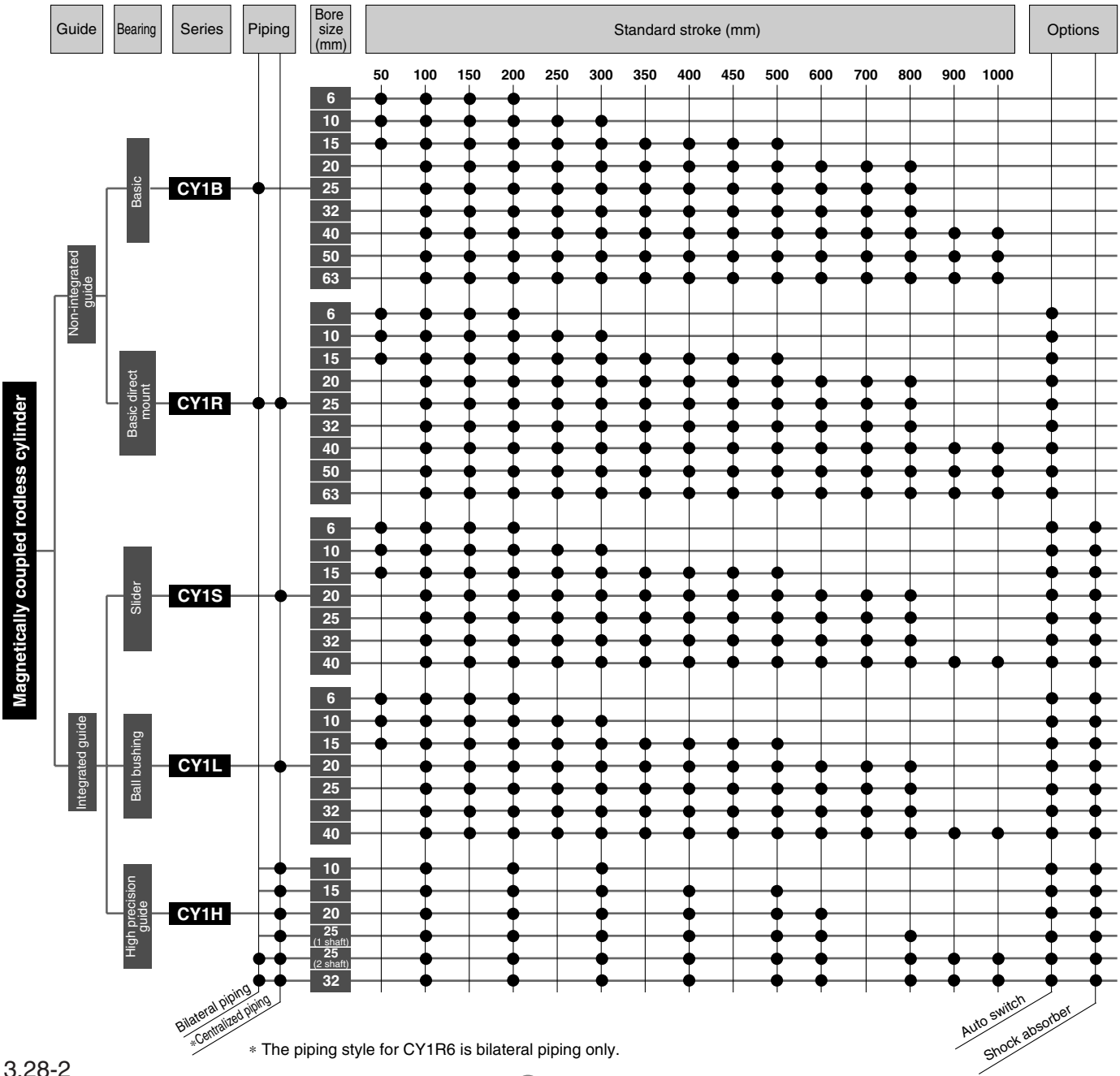



Magnetically coupled cylinders save space and have a wide range of applications.

# Magnetically coupled cylinders save space and have a wide range of applications

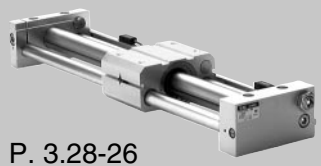
Can be used in many diverse environments, because there is no external leakage.
Basic direct mount (Series CY1R) and high precision guide (Series CY1H) have been added, and variations have been greatly increased.



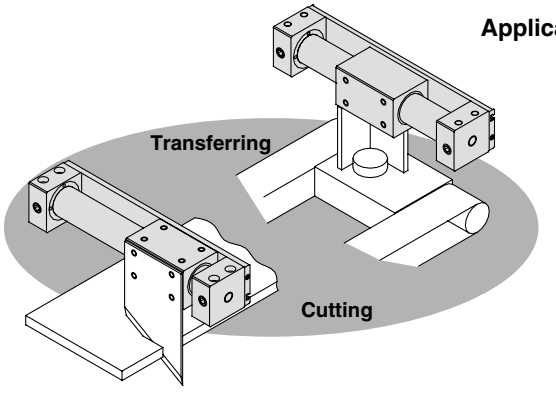




* The piping style for CY1R6 is bilateral piping only.

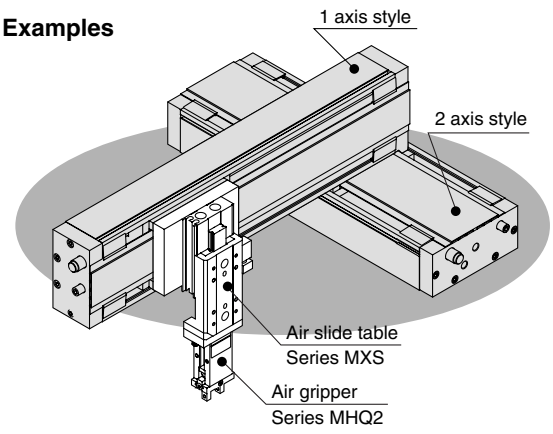
# *Series CY1B/CY1R/CY1S/CY1L/CY1H*
# Model Selection Criteria

| Model Selection Criteria | Recommended cylinder | | | |
|---|---|---|---|---|
| | | Appearance | Features | |
| • When used with many different guides.<br>• When a long stroke is necessary. | Non-integrated guide | **Series CY1B**<br>**Size: ø6, ø10, ø15, ø20, ø25, ø32, ø40, ø50, ø63**<br>  <br>P. 3.28-4 | • Wide variations from ø6 to ø63. | • A long stroke is possible. |
| • When used with many different guides.<br>• When auto switches are added to the basic style.<br>• When used without a guide for light loads. (Application Example 1)<br>• When space is very limited. | | **Series CY1R**<br>**Size: ø6, ø10, ø15, ø20, ø25, ø32, ø40, ø50, ø63**<br>  <br>P. 3.28-12 | | • Cylinder can be directly mounted.<br>• Auto switches can be mounted, and there is no lurching from cylinder.<br>• Turning can be stopped within an allowable range.<br>• Piping can be concentrated with the centralized piping style.<br>• External dimensions are compact.<br>• Mounting can be performed on the top body surface or on one side surface. |
| • To ensure a permanent path.<br>• When used for general transporting. | Integrated guide | **Series CY1S**<br>**Size: ø6, ø10, ø15, ø20, ø25, ø32, ø40,**<br>  <br>P. 3.28-26 | • A load can be carried directly by the integrated guide style.<br>• The centralized piping allows concentration of piping on one side plate.<br>• Auto switches can be mounted.<br>• Impact at the stroke end is absorbed by inclusion of a shock absorber. | • Smooth operation is possible through the use of a special slide bearing. |
| • To ensure a permanent path.<br>• When smoother operation is required even with an eccentric load. | | **Series CY1L**<br>**Size: ø10, ø15, ø20, ø25, ø32, ø40,**<br>  <br>P. 3.28-38 | | • Stable operation is possible even with an eccentric load, through the use of a ball bushing. |
| • To ensure a permanent path.<br>• When a larger load, larger moment or higher precision are required.<br>• When used for picking and placing, etc. (Application Example 2) | | **Series CY1H**<br>**Size: ø10, ø15, ø20, ø25, ø32,**<br>  <br>P. 3.28-48 | | • The use of a linear guide makes large loads, large moments and high precision possible.<br>• Mounting freedom is improved by providing T-slots on the monting surfaces<br>• A top cover is mounted over the sliding section of the cylinder to prevent scratches and damage, etc. |

**Application Examples**




**Application Example 1**




**Application Example 2**

# Magnetically Coupled Rodless Cylinder/Basic

# Series CY1B

## How to Order

**Basic** □ **CY1B** **25** **H** — **300**

**Basic**

**Bore size**

| | |
|---|---|
| **6** | 6mm |
| **10** | 10mm |
| **15** | 15mm |
| **20** | 20mm |
| **25** | 25mm |
| **32** | 32mm |
| **40** | 40mm |
| **50** | 50mm |
| **63** | 63mm |

**Standard stroke**
Refer to the standard stroke table below.

**Port size**
(ø20 to ø63)

| | |
|---|---|
| — | Rc(PT) |
| **E** | G(PF) |

**Magnetic holding force**
Refer to the magnet holding force table below.

| | |
|---|---|
| **H** | 6-63 |
| **L** | 20-63 |

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) | Maximum (1) available stroke (mm) |
|---|---|---|
| **6** | 50, 100, 150, 200 | 300 |
| **10** | 50, 100, 150, 200, 250, 300 | 500 |
| **15** | 50, 100, 150, 200, 250, 300, 350<br>400, 450, 500 | 1000 |
| **20** | 100, 150, 200, 250, 300, 350, 400, 450<br>500, 600, 700, 800 | 2000 |
| **25** | | 4000 |
| **32** | | |
| **40** | 100, 150, 200, 250, 300, 350, 400, 450<br>500, 600, 700, 800, 900, 1000 | 5000 |
| **50** | | 6000 |
| **63** | | |

Note 1) Contact SMC if the maximum stroke will be exceeded.

## Magnetic Holding Force (N)

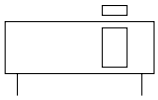
| Bore size (mm) | | **6** | **10** | **15** | **20** | **25** | **32** | **40** | **50** | **63** |
|---|---|---|---|---|---|---|---|---|---|---|
| Holding force | **H type** | 19.6 | 53.9 | 137 | 231 | 363 | 588 | 922 | 1471 | 2256 |
| | **L type** | — | — | 81.4 | 154 | 221 | 358 | 569 | 863 | 1373 |

## Strong holding force
H type/ø63·····2256 N
L type/ø63·····1373 N

## Available up to 6000mm stroke
(ø50, ø63)

## Long life with no external leakage

**JIS symbol**



**Order Made** **Made to Order**

Refer to p.5.4-1 regarding series CY1B made to order.

### Mounting Bracket

When mounting a floating bracket to a Series CY1B body, refer to p.5.4-104 for details.

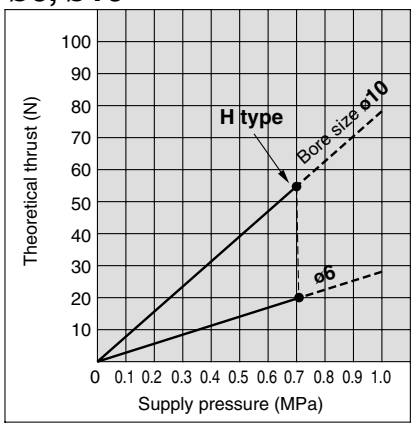
## Specifications

| | |
|---|---|
| **Fluid** | Air |
| **Proof pressure** | 1.05MPa |
| **Max. operating pressure** | 0.7MPa |
| **Min. operating pressure** | 0.18MPa |
| **Ambient & fluid temperature** | –10 to 60°C |
| **Piston speed** | 50 to 400mm/s |
| **Cushion** | Rubber bumpers at both ends |
| **Lubrication** | Non-lube |
| **Stroke length tolerance** | 0 to 250st: $^{+1.0}_{0}$, 251 to 1000st: $^{+1.4}_{0}$, 1001st & up: $^{+1.8}_{0}$ |
| **Mounting orientation** | Unrestricted |
| **Mounting nuts (2pcs.)** | Standard equipment (Accessory) |

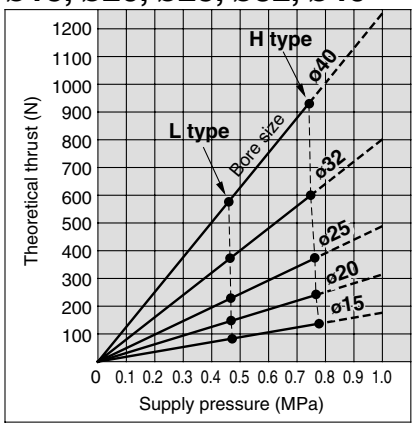
## Theoretical Cylinder Thrust

**⚠Caution**
When calculating the actual thrust, design should consider the minimum actuating pressure.

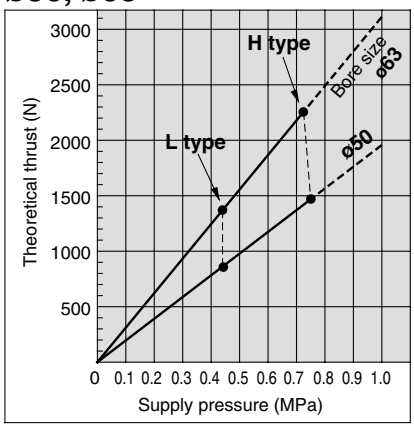
### ø6, ø10




### ø15, ø20, ø25, ø32, ø40




### ø50, ø63




## Weight

(kg)

| Magnet holding force / Bore (mm) | | 6 | 10 | 15 | 20 | 25 | 32 | 40 | 50 | 63 |
|---|---|---|---|---|---|---|---|---|---|---|
| Basic weight | CY1B□H | 0.075 | 0.08 | 0.28 | 0.37 | 0.71 | 1.34 | 2.15 | 3.4 | 5.7 |
| | CY1B□L | — | — | 0.22 | 0.26 | 0.62 | 1.19 | 1.97 | 3.1 | 5.2 |
| Additional weight per 50mm of stroke | | 0.004 | 0.014 | 0.02 | 0.04 | 0.05 | 0.07 | 0.08 | 0.095 | 0.12 |

Calculation example: CY1B32H-500

Basic weight·····1.34kg
Additional weight····0.07/50s
Cylinder stroke·····500st
} 1.34 + 0.07 X 500 ÷ 50 = 2.04kg

## Principal Materials

| Description | Material | Note |
|---|---|---|
| Head cover | Aluminum alloy | Electroless nickel plated |
| Cylinder tube | Stainless steel | |
| Body | Aluminum alloy | Hard anodized |
| Magnet | Rare earth element | |

# ⚠ Precautions

**Be sure to read before handling. Refer to p.0-39 to 0-43 for Safety Instructions and actuator precautions.**

## Mounting

## ⚠Caution

**① Take care to avoid nicks or other damage on the outside surface of the cylinder tube.**

This can lead to damage of the scraper and wear ring, which in turn can cause malfunction.

**② Take care regarding rotation of the external slider.**

Rotation should be controlled by connecting it to another shaft (linear guide, etc.).

**③ Do not operate with the magnetic coupling out of position.**

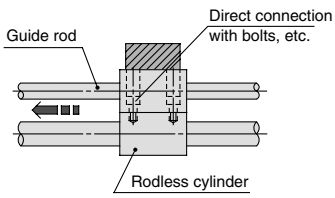
When the magnetic coupling is out of position, push the external slider back into the correct position by hand at the end of the stroke (or correct the piston slider with air pressure).

**④ Be sure that both head covers are secured to a mounting surface before operating the cylinder.**

Avoid operation with the external slider secured to the surface.

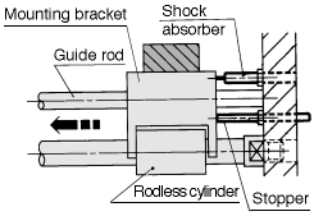
**⑤ Do not apply a lateral load to the external slider.**

When a load is mounted directly to the cylinder, variations in the alignment of each shaft centre cannot be assimilated, and this results in the generation of a lateral load that can cause malfunction. The cylinder should be operated using a connection method which allows for assimilation of shaft alignment variations and deflection due to the cylinder's own weight. A drawing of a recommended mounting is shown in Figure 2.




Variations in the load and cylinder shaft alignment cannot be assimilated, resulting in malfunction.

**Figure 1. Incorrect mounting**




Shaft alignment variations are assimilated by providing clearance for the mounting bracket and cylinder. Moreover, the cylinder is not subjected to moments.

**Figure 2. Recommended mounting**

**⑥ Use caution regarding the allowable load weight when operating in the vertical direction.**

The allowable load weight when operating in the vertical direction (reference values on p.3.28-9) is determined by the model selection method, however, if a load greater than the allowable value is applied, the magnetic coupling may break and there is a possibility of dropping the load. When using this kind of application, contact SMC regarding the operating conditions (pressure, load, speed, stroke, frequency, etc.).

## Disassembly & Maintenance

## ⚠Warning

**① Use caution as the power of the magnets is very strong.**

When removing the external slider and piston slider from the cylinder tube for maintenance. etc., handle with caution, since the magnets installed in each slider have very strong attractive power.

## ⚠Caution

**① When reattaching the head covers after disassembly, confirm that they are tightened securely.**

When disassembling, hold the wrench flat section of one head cover with a vise, and remove the other cover using a spanner or adjustable angle wrench on its wrench flat section. When retightening, first coat with Locktight (No. 542 red), and retighten 3 to 5° past the original position prior to removal.

**② Use caution when taking off the external slider, as the piston slider will be directly attracted to it.**

When removing the external slider or piston slider from the cylinder tube, first force the sliders out of their magnetically coupled positions and then remove them individually while there is no longer any holding force. If they are removed when still magnetically coupled, they will be directly attracted to one another and will not come apart.

**③ Since the magnetic holding force can be changed (for example, from CY1B25L to CY1B25H), contact SMC if this is necessary.**

**④ Do not disassemble the magnetic components (piston slider, external slider).**

This can cause a loss of holding force and malfunction.

**⑤ When disassembling to replace the seals and wear ring, refer to the separate disassembly instructions.**

**⑥ Note the direction of the external slider and piston slider.**

Since the external slider and piston slider are directional for ø6, ø10 and holding force type L, refer to the drawings below when performing disassembly or maintenance. Put the external slider and piston slider together, and insert the piston slider into the cylinder tube so that they will have the correct positional relationship as shown in Figure 3. If they align as in Figure 4, insert the piston slider after turning it around 180°. If the direction is not correct, it will be impossible to obtain the specified holding force.

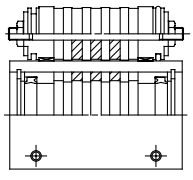


**Figure 3. Correct position**

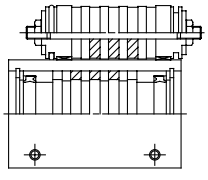


**Figure 4. Incorrect position**

Example for ø20 to ø63 with holding force type L

# How to Select ①

**E:** Kinetic energy of load (J)

$$E = \frac{(W+W_B)}{2} \times \left(\frac{V}{1000}\right)^2$$

**Es:** Allowable kinetic energy for intermediate stops using an air pressure circuit (J)
**Fn:** Allowable driving force (N)
**Ps:** Operating pressure limit for intermediate stops using an external stopper, etc. (MPa)
**Pv:** Maximum operating pressure for vertical operation (MPa)
**$W_{Bmax}$:** Maximum connection fitting weight (kg)
**Wv:** Allowable load weight for vertical operation (kg)

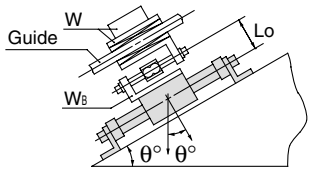
**Operating conditions**

- W: Load weight (kg)
- $W_B$: Connection fitting weight (kg)
- μ: Guide's coef. of friction
- Lo: Distance from cylinder shaft center to work piece point of application (cm)
- Mode of operation (horizonntal, inclined, vertical)
- P: Operating pressure (MPa)
- V: Speed (mm/s)
- Stroke (mm)

Mode of operation

- Horizontal operation
- Inclined operation
- Vertical operation (1)

Review of load weight and operating pressure



Inclined operation

First tentative bore size determination

$$\text{øD} \geqq 1.6 \times \sqrt{\frac{F_1}{P}}$$

$$\text{øD} \geqq 1.6 \times \sqrt{\frac{F_2}{P}}$$

$$\text{øD} \geqq 1.6 \times \sqrt{\frac{F_3}{P}}$$

**Allowable driving force table (Fn)** (n=1,2,3)

| | |
|---|---|
| Horizontal | $F_1 = \mu \times (W + W_B) \times 9.8$ |
| Inclined | $F_2 = (W + W_B) \times 9.8 \times (\mu\cos\theta \times \sin\theta)$ |
| Vertical | $F_3 = (W + W_B) \times 9.8 \times (\mu + 1)$ |

Refer to the allowable driving force table for the (Fn) of data A.

Determination of allowable load weight & pressure
- $W + W_B \leqq W_V$, $P \leqq P_V$
- $W + W_B > W_V$, $P > P_V$

(Refer to p.3.28-9 for vertical operation.)

(Refer to p.3.28-9 for connection fitting weight.)

Determination of connection fitting weight ($W_B$)
- $W_B > W_{BMAX}$ → Review of connection fitting
- $W_B \leqq W_{Bmax}$

(Refer to p.3.28-8 for data A.)

Second tentative determination of bore size and magnet holding force (H, L) using the graph of allowable driving force (Fn) and distance from cylinder shaft centre (Lo)

Review with magnet holding force (H)

Intermediate stop? (1)
- Yes → Intermediate stopping method
  - Stop with external stopper
  - Stop with air pressure circuit (Refer to p.3.28-9 for intermediate stops.)
- No

Determination of load's kinetic energy (E)
- E > Es → Tentative determination of L type $E = \frac{(W+W_B)}{2} \times \left(\frac{V}{1000}\right)^2$
- E ≦ Es → Bore size determination

Determination of pressure (P) when making intermediate stop
- P > Ps → Tentative determination of L type
- P ≦ Ps → E > Es

(Refer to p.3.28-9 for intermediate stops.)

Tentative determination of H type → Review of larger bore size

Consider order made products based on operating conditions (2)

(Refer to p.5.4-1 and p.5.4-79.)

**Model determination**

Note 1) This cylinder cannot perform an intermediate stop using an air pressure circuit in vertical operation. In this case, an intermediate stop can be performed only by using an external stopper, etc.
Note 2) Depending on the operating environment, etc., order made products should also be considered.

# How to Select ②

**Precautions on Design ①**

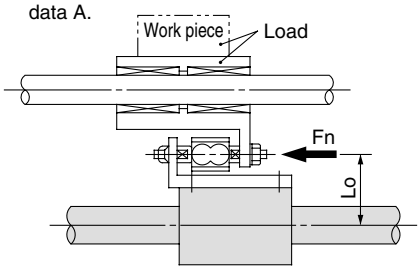
## Selection Method

### Selection procedure

① Find the drive resisting force Fn (N) when moving the load horizontally.

② Find the distance Lo (cm) from the point of the load where driving force is applied, to the centre of the cylinder shaft.

③ Select the bore size and magnet holding force (types H, L) from Lo and Fn based on data A.



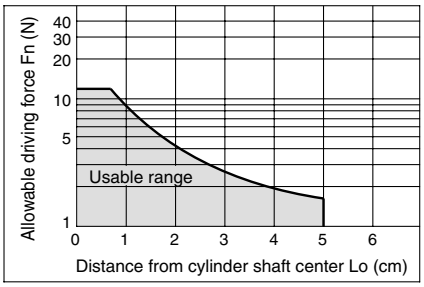

### Selection example

Given a load drive resisting force of Fn = 100 (N) and distance from the cylinder shaft centre to the load application point of Lo = 8cm, find the intersection point by extending upward from the horizontal axis of data A where the distance from the shaft centre is 8cm, and then extending to the side, find the allowable driving force on the vertical axis.

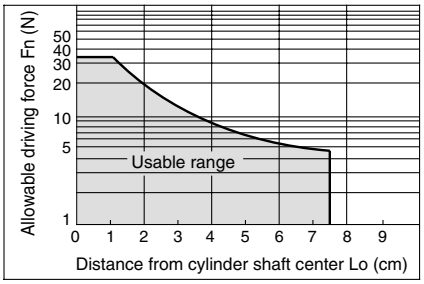
Models suitable to satisfy the requirement of 100 (N) are **CY1B32H** or **CY1B40H, CY1B40L.**

**<Data A: Distance from cylinder shaft centre — Allowable driving capacity>**

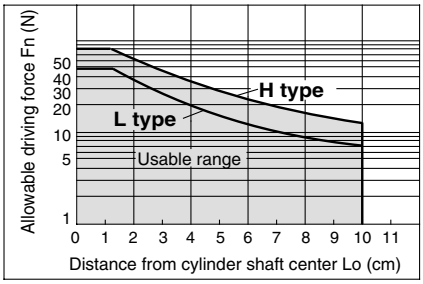
**CY1B6**



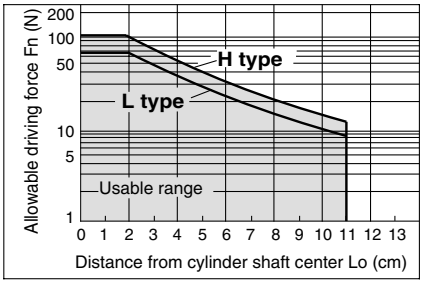

**CY1B10**



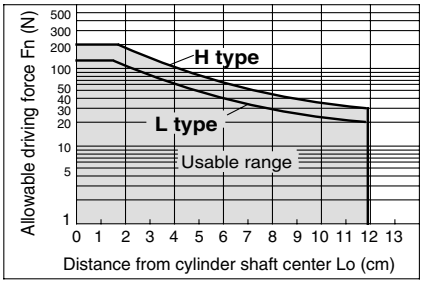

**CY1B15**



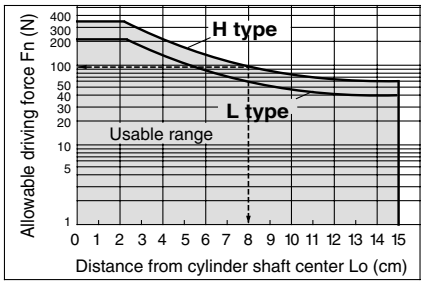

**CY1B20**



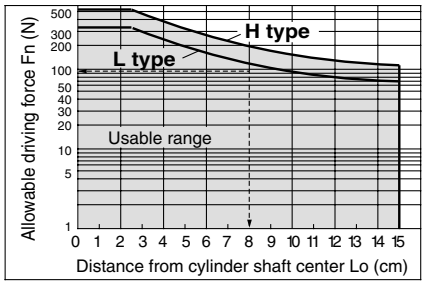

**CY1B25**



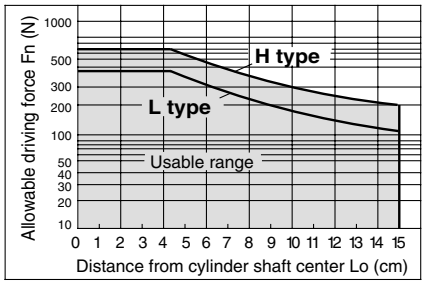

**CY1B32**



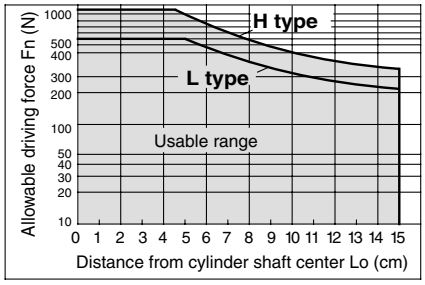

**CY1B40**




**CY1B50**




**CY1B63**

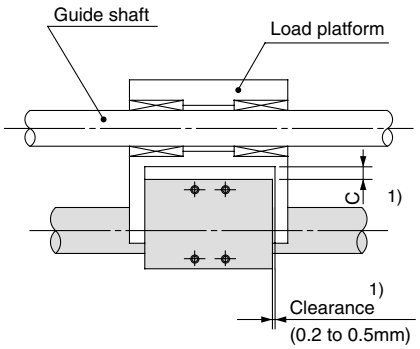


# How to Select ③

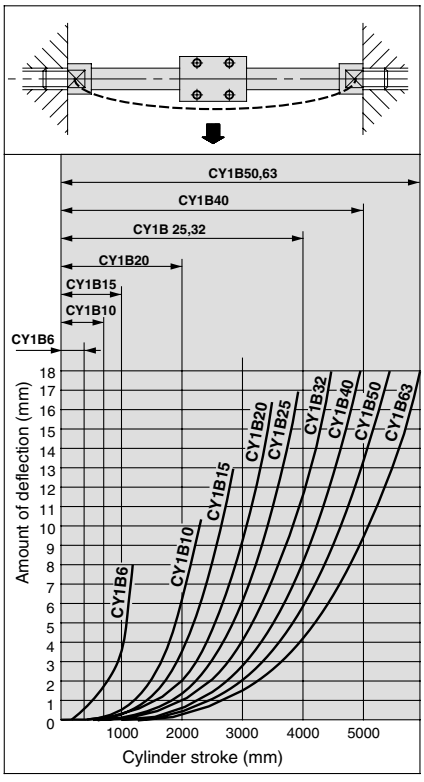
## Precautions on Design ②

### Cylinder Dead Weight Deflection

When the cylinder is mounted horizontally, deflection occurs due to its own weight as shown in the data, and the longer the stroke, the greater the amount of variation in the shaft centre.



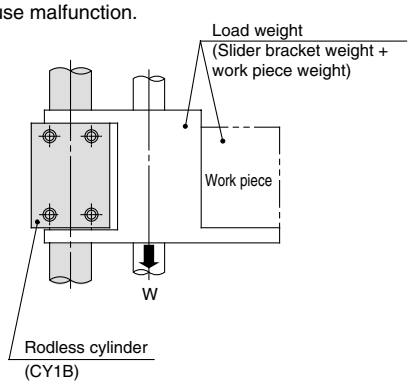

Note 1) Referring to the self weight deflection in the figure below, provide clearance so that the cylinder does not touch the mounting surface or the load section, and is able to operate smoothly within the minimum operating pressure range for a full stroke.




∗ The above deflection data indicate values when the external slider has moved to the middle of the stroke.

### Vertical Operation

The load should be guided by a ball style bearing (LM guide, etc.). If a slide bearing is used, sliding resistance increases due to the load weight and load moment, which can cause malfunction.




| Bore size (mm) | Model | Allowable load weight (Wv) (kg) | Max. operating press (Pv) (MPa) |
|---|---|---|---|
| 6 | CY1B 6H | 1.0 | 0.55 |
| 10 | CY1B10H | 2.7 | 0.55 |
| 15 | CY1B15H | 7.0 | 0.65 |
| | CY1B15L | 4.1 | 0.40 |
| 20 | CY1B20H | 11.0 | 0.65 |
| | CY1B20L | 7.0 | 0.40 |
| 25 | CY1B25H | 18.5 | 0.65 |
| | CY1B25L | 11.2 | 0.40 |
| 32 | CY1B32H | 30.0 | 0.65 |
| | CY1B32L | 18.2 | 0.40 |
| 40 | CY1B40H | 47.0 | 0.65 |
| | CY1B40L | 29.0 | 0.40 |
| 50 | CY1B50H | 75.0 | 0.65 |
| | CY1B50L | 44.0 | 0.40 |
| 63 | CY1B63H | 115.0 | 0.65 |
| | CY1B63L | 70.0 | 0.40 |

Note) Use caution, as operation above the maximum operating pressure can break the magnetic coupling.

### Max. Connection Fitting Weight

The CY1B (basic style)is not directly connected to the load, and is guided by another shaft (LM guide, etc.). Load connection fittings should be designed so that they do not exceed the weights given in the table below. (Refer to the separate instruction manual for the connection method.)

**Maximum connection fitting weight**

| Model | Max. connection fitting weight ($W_{Bmax}$) (kg) |
|---|---|
| CY1B 6H | 0.2 |
| 10H | 0.4 |
| 15□ | 1.0 |
| 20□ | 1.1 |
| 25□ | 1.2 |
| 32□ | 1.5 |
| 40□ | 2.0 |
| 50□ | 2.5 |
| 63□ | 3.0 |

Contact SMC before using fittings which exceed the above weights.

### Intermediate Stops

#### (1) Intermediate stops of load with an external stopper, etc.

When stopping a load in mid-stroke using an external stopper, etc., operate within the operating pressure limits shown in the table below. Use caution, as operation at a pressure exceeding these limits can break the magnetic coupling.

| Bore size (mm) | Model | Operating pressure limit for intermediate stops (Ps) (MPa) |
|---|---|---|
| 6 | CY1B 6H | 0.55 |
| 10 | CY1B10H | 0.55 |
| 15 | CY1B15H | 0.65 |
| | CY1B15L | 0.40 |
| 20 | CY1B20H | 0.65 |
| | CY1B20L | 0.40 |
| 25 | CY1B25H | 0.65 |
| | CY1B25L | 0.40 |
| 32 | CY1B32H | 0.65 |
| | CY1B32L | 0.40 |
| 40 | CY1B40H | 0.65 |
| | CY1B40L | 0.40 |
| 50 | CY1B50H | 0.65 |
| | CY1B50L | 0.40 |
| 63 | CY1B63H | 0.65 |
| | CY1B63L | 0.40 |

#### (2) Intermediate stops of load with an air pressure circuit

When performing an intermediate stop of a load using an air pressure circuit, operate within the kinetic energy limits shown in the table below. Use caution, as operation when exceeding the allowable value can result in breaking of the magnetic coupling.

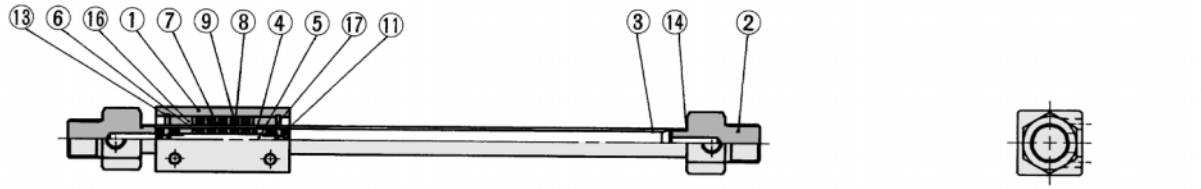
(Reference values)

| Bore size (mm) | Model | Allowable kinetic energy for intermediate stops (Es) (J) |
|---|---|---|
| 6 | CY1B 6H | 0.007 |
| 10 | CY1B10H | 0.03 |
| 15 | CY1B15H | 0.13 |
| | CY1B15L | 0.076 |
| 20 | CY1B20H | 0.24 |
| | CY1B20L | 0.16 |
| 25 | CY1B25H | 0.45 |
| | CY1B25L | 0.27 |
| 32 | CY1B32H | 0.88 |
| | CY1B32L | 0.53 |
| 40 | CY1B40H | 1.53 |
| | CY1B40L | 0.95 |
| 50 | CY1B50H | 3.12 |
| | CY1B50L | 1.83 |
| 63 | CY1B63H | 5.07 |
| | CY1B63L | 3.09 |

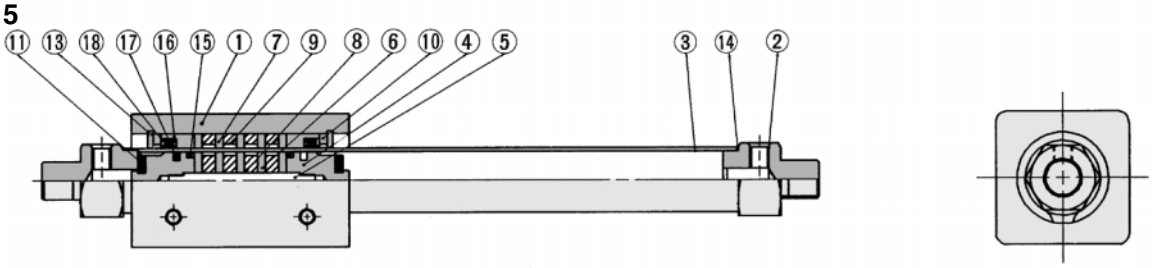
## Construction

### Basic

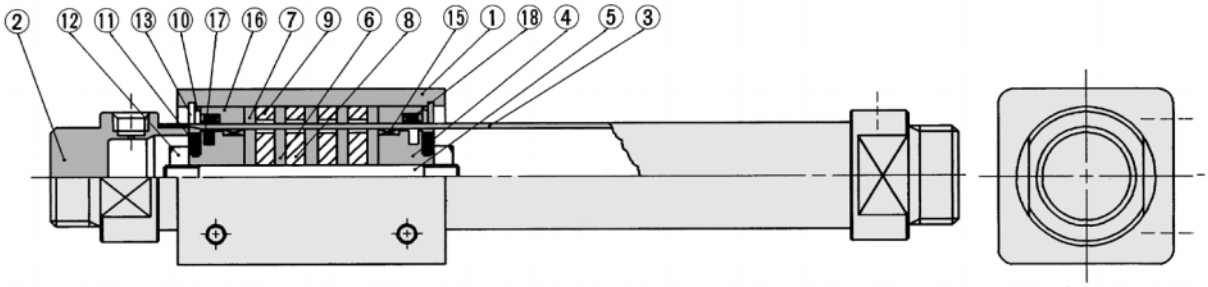
**CY1B6**

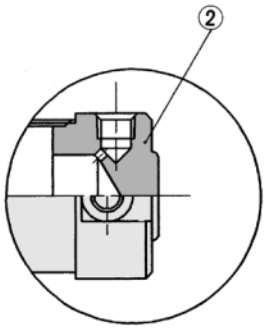



**CY1B10, 15**




**CY1B20 to 40**




**For CY1B50, 63**

### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Body | Aluminum alloy | Hard anodized |
| ② | Head cover | Aluminum alloy | Electroless nickel plated |
| ③ | Cylinder tube | Stainless steel | |
| ④ | Piston | Aluminum alloy (1) | Chromated |
| ⑤ | Shaft | Stainless steel | |
| ⑥ | Piston side yoke | Rolled steel plate | Zinc chromated |
| ⑦ | External slider side yoke | Rolled steel plate | Zinc chromated |
| ⑧ | Magnet A | Rare earth magnet | |
| ⑨ | Magnet B | Rare earth magnet | |
| ⑩ | Spacer | Rolled steel plate | Nickel plated |
| ⑪ | Bumper | Urethane rubber | |
| ⑫ | Piston nut | Carbon steel | Zinc chromated |
| ⑬ | Snap ring | Carbon tool steel | Nickel plated |
| ⑭* | Cylinder tube gasket | NBR | **CY1B6:** ø7 X ø5 X ø1<br>**CY1B10:** ø11 X ø9 X ø1 |
| ⑮* | Wear ring A | Special resin | ø6 not available |
| ⑯* | Wear ring B | Special resin | |
| ⑰* | Piston seal | NBR | |
| ⑱* | Scraper | NBR | ø6 not available |

Note 1) Brass in the case of ø6 to ø15

### Replacement Parts: Seal Kits

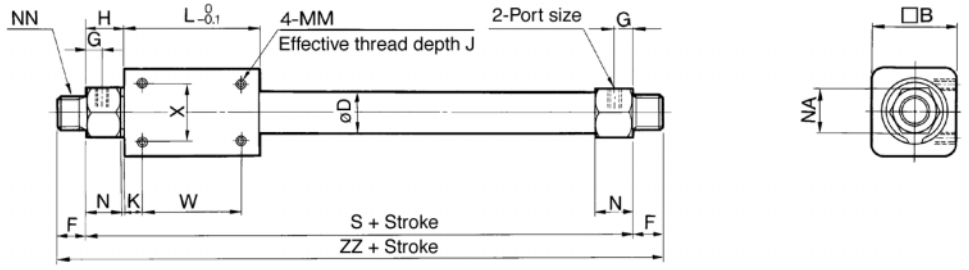
| Bore size (mm) | Kit No. | Content |
|---|---|---|
| **6** | CY1B6-PS-N | Nos. ⑭, ⑯, ⑰ at the left |
| **10** | CY1B10-PS-N | Nos. ⑭, ⑮, ⑯, ⑰, ⑱ at the left |
| **15** | CY1B15-PS-N | Nos. ⑮, ⑯, ⑰, ⑱ at the left |
| **20** | CY1B20-PS-N | |
| **25** | CY1B25-PS-N | |
| **32** | CY1B32-PS-N | |
| **40** | CY1B40-PS-N | |
| **50** | CY1B50-PS-N | |
| **63** | CY1B63-PS-N | |

* Seal kits include numbers ⑭ through ⑱, and may be orderd using the order number for each bore size.

## Dimensions

### Basic

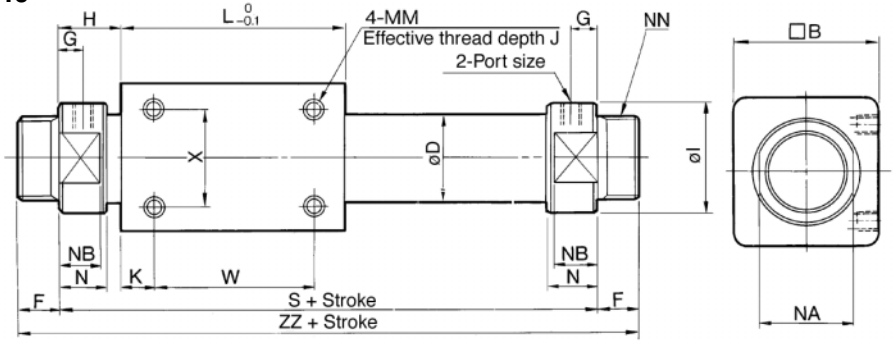
**CY1B6, 10, 15**



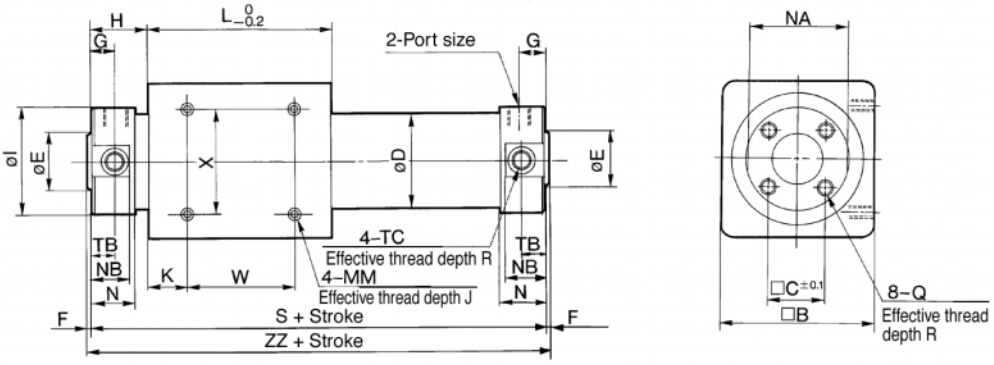

(mm)

| Model | Port size | D | B | F | G | H | K | L | N | NA | MM X J | NN | S | W | X | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1B6** | M5 | 7.6 | 17 | 9 | 5 | 14 | 5 | 35 | 10 | 14 | M3 X 4.5 | M10 X 1.0 | 63 | 25 | 10 | 81 |
| **CY1B10** | M5 | 12 | 25 | 9 | 5 | 12.5 | 4 | 38 | 11 | 14 | M3 X 4.5 | M10 X 1.0 | 63 | 30 | 16 | 81 |
| **CY1B15** | M5 | 17 | 35 | 10 | 5.5 | 13 | 11 | 57 | 11 | 17 | M4 X 6 | M10 X 1.0 | 83 | 35 | 19 | 103 |

**CY1B20 to 40**




**CY1B50, 63**

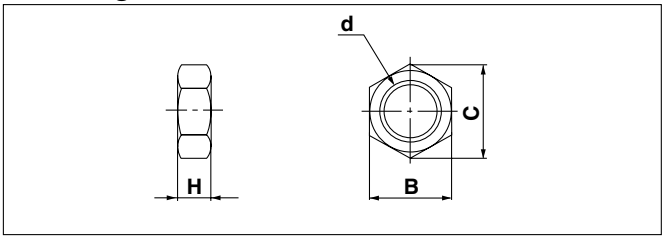



(mm)

| Model | Port size | B | C | D | E | F | G | H | I | K | L | MM X J | N | NA | NB | NN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1B20** | 1/8 | 36 | — | 22.8 | — | 13 | 8 | 20 | 28 | 8 | 66 | M4 X 6 | 15 | 24 | 13 | M20 X 1.5 |
| **CY1B25** | 1/8 | 46 | — | 27.8 | — | 13 | 8 | 20.5 | 34 | 10 | 70 | M5 X 8 | 15 | 30 | 13 | M26 X 1.5 |
| **CY1B32** | 1/8 | 60 | — | 35 | — | 16 | 9 | 22 | 40 | 15 | 80 | M6 X 8 | 17 | 36 | 15 | M26 X 1.5 |
| **CY1B40** | 1/4 | 70 | — | 43 | — | 16 | 11 | 29 | 50 | 16 | 92 | M6 X 10 | 21 | 46 | 19 | M32 X 2.0 |
| **CY1B50** | 1/4 | 86 | 32 | 53 | $30^{-0.007}_{-0.037}$ | 2 | 14 | 33 | 58.2 | 25 | 110 | M8 X 12 | 25 | 55 | 23 | — |
| **CY1B63** | 1/4 | 100 | 38 | 66 | $32^{-0.007}_{-0.043}$ | 2 | 14 | 33 | 72.2 | 26 | 122 | M8 X 12 | 25 | 69 | 23 | — |

| Model | Q X R | S | TB | TC X R | W | X | ZZ |
|---|---|---|---|---|---|---|---|
| **CY1B20** | — | 106 | — | — | 50 | 25 | 132 |
| **CY1B25** | — | 111 | — | — | 50 | 30 | 137 |
| **CY1B32** | — | 124 | — | — | 50 | 40 | 156 |
| **CY1B40** | — | 150 | — | — | 60 | 40 | 182 |
| **CY1B50** | M8 X 16 | 176 | 14 | M12 X 1.25 X 7.5 | 60 | 60 | 180 |
| **CY1B63** | M10 X 16 | 188 | 14 | M14 X 1.5 X 11.5 | 70 | 70 | 192 |

**Mounting nut/included (2 pcs.)** (except for ø50 and ø63)




| Part No. | Bore size (mm) | d | H | B | C |
|---|---|---|---|---|---|
| **SNJ-016B** | **6, 10, 15** | M10 X 1.0 | 4 | 14 | 16.2 |
| **SN-020B** | **20** | M20 X 1.5 | 8 | 26 | 30 |
| **SN-032B** | **25, 32** | M26 X 1.5 | 8 | 32 | 37 |
| **SN-040B** | **40** | M32 X 2.0 | 10 | 41 | 47.3 |

# Magnetically Coupled Rodless Cylinder/Direct Mount

# Series CY1R

## How to Order

□ **CY1R** □ **25** **H** — **300** □ — **Z73** □

**Direct mount**

**Port size** (ø20 to ø63)

| | |
|---|---|
| — | Rc(PT) |
| **E** | G(PF) |

**Piping**

| | |
|---|---|
| — | Standard |
| **G** | Centralized piping |

Note) G type is not available for ø6.

**Bore size**

| | |
|---|---|
| **6** | 6mm |
| **10** | 10mm |
| **15** | 15mm |
| **20** | 20mm |
| **25** | 25mm |
| **32** | 32mm |
| **40** | 40mm |
| **50** | 50mm |
| **63** | 63mm |

**Magnetic holding force**

| Holding force style | Applicable bore size (mm) |
|---|---|
| **H** | 6 to 63 |
| **L** | 20 to 63 |

Refer to the magnet holding force table on p.3.28-13.

**Standard stroke**

Refer to the standard stroke table on p.3.28-13.

**Switch rail**

| | |
|---|---|
| — | With switch rail |
| **N** | Without switch rail |

Note 1) Symbol N is standard only.
Note 2) With the switch rail, a built-in switch magnet is also included.
Note 3) For ø15, the built-in switch magnet is included even without the switch rail.

**Auto switch**

| | |
|---|---|
| — | Without auto switch |

**Note 1) Auto switches can be mounted on H type only.**
Note 2) In the case of ø20 with switch rail but without switch, the cylinder construction is for reed switch.
∗ Refer to the table below for auto switch part numbers.

**Number of auto switches**

| | |
|---|---|
| — | 2 |
| **S** | 1 |
| **n** | n |

These auto switches have been changed
Contact SMC or view www.smcworld.com

| | |
|---|---|
| F9N➡**M9N** | F9NV➡**M9NV** |
| F9P➡**M9P** | F9PV➡**M9PV** |
| F9B➡**M9B** | F9BV➡**M9BV** |

**Applicable Auto Switches ø6, ø10, ø15, ø20/**Refer to p.5.3-2 for further information on auto switch.

| Style | Special function | Electrical entry | Indicator | Wiring (Output) | Load voltage DC | | Load voltage AC | Auto switch model | Lead wire (m) (1) 0.5 (—) | 3 (L) | 5 (Z) | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | No | 2 wire | 24V | 5, 12V | ≤100V | **A90** | ● | ● | — | IC | Relay, PLC |
| | | | Yes | | | 12V | 100V | **A93** | ● | ● | — | — | |
| | | | | 3 wire (Equiv. NPN) | — | 5V | — | **A96** | ● | ● | — | IC | — |
| Solid state switch | — | Grommet | Yes | 3 wire (NPN) | 24V | 12V | — | **F9N** | ● | ● | — | — | Relay, PLC |
| | | | | 3 wire (PNP) | | | | **F9P** | ● | ● | — | | |
| | | | | 2 wire | | | | **F9B** | ● | ● | — | | |

Note 1) Lead wire length 0.5m····· — (Example) F9N
3m····· L F9NL

**ø25, ø32, ø40, ø50, ø63**

| Style | Special function | Electrical entry | Indicator | Wiring (Output) | Load voltage DC | | Load voltage AC | Auto switch model | Lead wire (m) (1) 0.5 (—) | 3 (L) | 5 (Z) | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3 wire | — | 5V | — | **Z76** | ● | ● | — | IC | — |
| | | | | 2 wire | 24V | 12V | 100V | **Z73** | ● | ● | ● | — | Relay, PLC |
| | | | No | | | 5, 12V | ≤100V | **Z80** | ● | ● | — | IC | |
| Solid state switch | — | Grommet | Yes | 3 wire (NPN) | 24V | 5, 12V | — | **Y59A** | ● | ● | ○ | IC | Relay, PLC |
| | | | | 3 wire (PNP) | | | | **Y7P** | ● | ● | ○ | | |
| | | | | 2 wire | | 12V | | **Y59B** | ● | ● | ○ | — | |
| | Diagnostic indicator (2 colour) | | | 3 wire (NPN) | | 5, 12V | | **Y7NW** | ● | ● | ○ | IC | |
| | | | | 3 wire (PNP) | | | | **Y7PW** | ● | ● | ○ | | |
| | | | | 2 wire | | 12V | | **Y7BW** | ● | ● | ○ | — | |

Note 1) Lead wire length 0.5m····· — (Example) FY59N
3m····· L Y59AL
5m····· Z Y59AZ
Note 2) Solid state switches marked with a "○" are manufactured upon receipt of order.

## Specifications

| | |
|---|---|
| **Fluid** | Air |
| **Proof pressure** | 1.05MPa |
| **Max. operating pressure** | 0.7MPa |
| **Min. operating pressure** | 0.18MPa |
| **Ambient & fluid temperature** | –10 to 60°C |
| **Piston speed (1)** | 50 to 500mm/s |
| **Cushion** | Rubber bumpers at both ends |
| **Lubrication** | Non-lube |
| **Stroke length tolerance** | 0 to 250st: $^{+1.0}_{0}$, 251 to 1000st: $^{+1.4}_{0}$, 1001st &: $^{+1.8}_{0}$ |
| **Mounting method** | Direct mounted style |

Note 1) When an auto switch is placed at an intermediate position, the maximum piston speed should be limited to no more than 300mm/s due to relays, etc.

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) | Max. available (1) stroke (mm) | Max. stroke with switch (mm) |
|---|---|---|---|
| **6** | 50, 100, 150, 200 | 300 | 300 |
| **10** | 50, 100, 150, 200, 250, 300 | 500 | 500 |
| **15** | 50, 100, 150, 200, 250, 300<br>350, 400, 450, 500 | 1000 | 750 |
| **20** | 100, 150, 200, 250, 300, 350<br>400, 450, 500, 600, 700, 800 | 1500 | 1000 |
| **25** | | 2000 | 1500 |
| **32** | | | |
| **40** | 100, 150, 200, 250, 300, 350<br>400, 450, 500, 600, 700, 800<br>900, 1000 | 2000 | 1500 |
| **50** | | | |
| **63** | | | |

Note 1) Contact SMC if the maximum stroke will be exceeded.

## Magnetic Holding Force (N)

| Bore size (mm) | | 6 | 10 | 15 | 20 | 25 | 32 | 40 | 50 | 63 |
|---|---|---|---|---|---|---|---|---|---|---|
| Holding force | **H type** | 19.6 | 53.9 | 137 | 231 | 363 | 588 | 922 | 1471 | 2256 |
| | **L type** | — | — | — | 154 | 221 | 358 | 569 | 863 | 1373 |

## Made to Order

Refer to p.5.4-1 regarding series CY1R made to order.

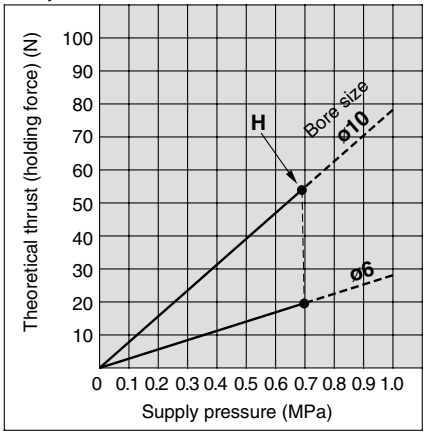
## Mounting Bracket

When mounting a floating bracket to a Series CY1R body, refer to p.5.4-104 for details.

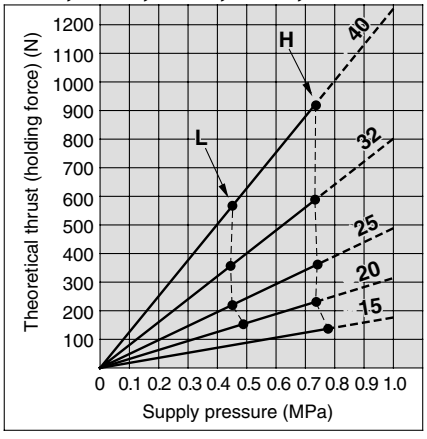
## Theoretical Cylinder Thrust

**⚠Caution** **When calculating the actual thrust, design should consider the minimum actuating pressure.**

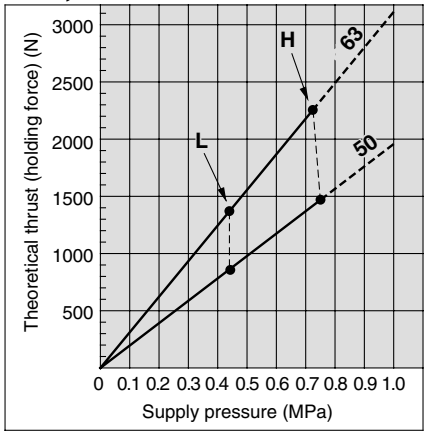
### ø6, ø10




### ø15, ø20, ø25, ø32, ø40




### ø50, ø63



## Weight

Unit: kg

| Item \ Bore size (mm) | | 6 | 10 | 15 | 20 | 25 | 32 | 40 | 50 | 63 |
|---|---|---|---|---|---|---|---|---|---|---|
| Basic weight (for 0st) | CY1R□H<br>CY1RG□H (with switch rail) | 0.092 | 0.111 | 0.277 | 0.440 | 0.660 | 1.27 | 2.06 | 3.59 | 5.45 |
| | CY1R□L<br>CY1RG□L (with switch rail) | — | — | — | 0.330 | 0.570 | 1.12 | 1.88 | 3.29 | 4.95 |
| | CY1R□H<br>(without switch rail) | 0.075 | 0.080 | 0.230 | 0.370 | 0.580 | 1.15 | 1.90 | 3.30 | 5.10 |
| | CY1R□L<br>(without switch rail) | — | — | — | 0.260 | 0.490 | 1.00 | 1.72 | 3.00 | 4.60 |
| Additional weight per 50st (with switch rail) | | 0.016 | 0.034 | 0.045 | 0.071 | 0.083 | 0.113 | 0.133 | 0.177 | 0.212 |
| Additional weight per 50st (without switch rail) | | 0.004 | 0.014 | 0.020 | 0.040 | 0.050 | 0.070 | 0.080 | 0.095 | 0.120 |

Calculation example: CY1R25H-500 (with switch rail)
Basic weight···0.660 (kg), Additional weight···0.083 (kg/50st), Cylinder stroke···500 (st)
0.660 + 0.083 X 500 ÷ 50 = 1.49 (kg)

# ⚠ Precautions

**Be sure to read before handling. Refer to p.0-39 to 0-43 for Safety Instructions and actuator precautions.**

## Mounting

### ⚠Caution

① **Take care to avoid nicks or other damage on the outside surface of the cylinder tube.**
This can lead to damage of the scraper and wear ring, which in turn can cause malfunction.

② **Take care regarding rotation of the external slider.**
Rotation should be controlled by connecting it to another shaft (linear guide, etc.).

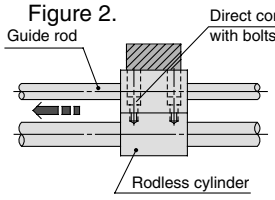
③ **Do not operate with the magnetic coupling out of position.**
When the magnetic coupling is out of position, push the external slider back into the correct position by hand at the end of the stroke (or correct the piston slider with air pressure).

④ **The cylinder is mounted with bolts through the mounting holes in the end covers. Be sure they are tightened securely.**

⑤ **If gaps occur between the mounting surface and the end covers when mounting with bolts, perform shim adjustment using spacers, etc. so that there is no unreasonable stress.**

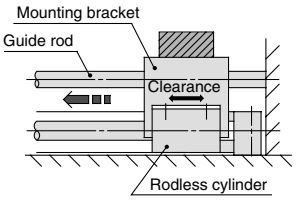
⑥ **Be sure that both end covers are secured to the mounting surface before operating the cylinder.**
Avoid operation with the external slider secured to the surface.

⑦ **Do not apply a lateral load to the external slider.**
When a load is mounted directly to the cylinder, variations in the alignment of each shaft centre cannot be assimilated, wich results in the generation of a lateral load that can cause malfunction. The cylinder should be operated using a connection method which allows for assimilation of shaft alignment variations and deflection due to the cylinder's own weight. A drawing of a recommended mounting is shown in Figure 2.




Variations in the load and cylinder shaft alignment cannot be assimilated, resulting in malfunction.

**Figure 1. Incorrect mounting**




Shaft alignment variations are assimilated by providing clearance for the mounting bracket and cylinder. Moreover, the cylinder is not subjected to moments.

**Figure 2. Recommended mounting**

⑧ **Use caution regarding the allowable load weight when operating in the vertical direction.**
The allowable load weight when operating in the vertical direction (reference values on p.3.28-18 is determined by the model selection method, however, if a load greater than the allowable value is applied, the magnetic coupling may break and there is a possibility of dropping the load. When using this kind of application, contact SMC regarding the operating conditions (pressure, load, speed, stroke, frequency, etc.).

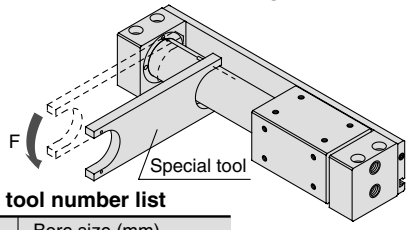
## Disassembly & Maintenance

### ⚠Warning

① **Use caution as the power of the magnets is very strong.**
When removing the external slider and piston slider from the cylinder tube for maintenance. etc., handle with caution, since the magnets installed in each slider have very strong attractive power.

### ⚠Caution

① **Special tools are necessary for disassembly.**




**Special tool number list**

| No. | Bore size (mm) |
|---|---|
| **CYRZ-V** | 6, 10, 15, 20 |
| **CYRZ-W** | 25, 32, 40 |
| **CYRZ-X** | 50 |
| **CYRZ-Y** | 63 |

② **Use caution when taking off the external slider, as the piston slider will be directly attracted to it.**
When removing the external slider or piston slider from the cylinder tube, first force the sliders out of their magnetically coupled positions and then remove them individually when there is no longer any holding force. If they are removed when still magnetically coupled, they will be directly attracted to one another and will not come apart.

③ **Since the magnetic holding force can be changed (for example, from CY1R25L to CY1R25H), contact SMC if this is necessary.**

④ **Do not disassemble the magnetic components (piston slider, external slider).**
This can cause a loss of holding force and malfunction.

⑤ **When disassembling to replace the seals and wear ring, refer to the separate disassembly instructions.**

⑥ **Note the direction of the external slider and piston slider.**
Since the external slider and piston slider are directional for ø6, ø10 and holding force type L, refer to the drawings below when performing disassembly or maintenance. Put the external slider and piston slider together, and insert the piston slider into the cylinder tube so that they will have the correct positional relationship as shown in Figure 3. If they align as in Figure 4, insert the piston slider after turning it around 180°. If the direction is not correct, it will be impossible to obtain the specified holding force.

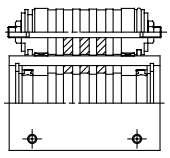


**Figure 3. Correct position**

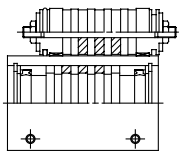


**Figure 4. Incorrect position**

Example for ø20 to ø63 with holding force type L

# How to Select ①

**E:** Kinetic energy of load (J)

$$E=\frac{(W+W_B)}{2}\times\left(\frac{V}{1000}\right)^2$$

**Es:** Allowable kinetic energy for intermediate stops using an air pressure circuit (J)
**Fn:** Allowable driving force (N)
**MD:** Maximum allowable moment (Nm) when a connection fitting, etc. is carreid directly
**Ps:** Operating pressure limit for intermediate stops using an external stopper, etc. (MPa)
**Pv:** Maximum operating pressure for vertical operation (MPa)
**WBmax:** Maximum load weight (kg) when loaded directly on the body

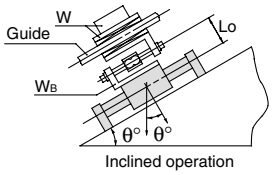
**Operating conditions**

- W: Load weight (kg)
- WB: Connection fitting weight (kg)
- μ: Guide's coef. of friction
- Lo: Distance from cylider shaft centre to work piece point of application (cm)
- L1: Distance from cylinder shaft centre to connection fitting, etc. centre of gravity (mm)
- Switches
- P: Operating pressure (MPa)
- V: Speed (mm/s)
- Stroke (mm)
- Mode of operation (horizontal, inclined, vertical)

Mode of operation

Horizontal operation | Inclined operation | Vertical operation (1)

Review of load weight and operating pressure



Inclined operation

First tentative bore size determination $\phi D \geqq 1.6 \times \sqrt{\frac{F_1}{P}}$

First tentative bore size determination $\phi D \geqq 1.6 \times \sqrt{\frac{F_2}{P}}$

First tentative bore size determination $\phi D \geqq 1.6 \times \sqrt{\frac{F_3}{P}}$

**Allowable driving force table (Fn)** (n=1,2,3)

| | |
|---|---|
| Horizontal | $F_1 = \mu \times (W + W_B) \times 9.8$ |
| Inclined | $F_2 = (W + W_B) \times 9.8 \times (\mu\cos\theta \times \sin\theta)$ |
| Vertical | $F_3 = (W + W_B) \times 9.8 \times (\mu + 1)$ |

Refer to the allowable driving force table for the (Fn) of data A.

Determination of allowable load weight & pressure
W + WB ≦ WV, P ≦ PV
W + WB > WV, P > PV (Refer to p.3.28-18 for vertical operation.)

(Refer to p.3.28-18 for the maximum load weight when loaded directly on the body.)

Determination of connection fitting weight (WB)
WB > WBmax → Review of connection fitting
WB ≦ WBmax

Review of switch use and stroke

Equipped with switch rail — YES → Equipped with switches — YES → Determination of stroke with switch — NG (Refer to standard stroke table on p.3.28-13) / OK

NO (Refer to data A on p.3.28-17)

Second tentative determination of bore size and magnet holding power (H, L) using the graph of allowable driving force (Fn) and distance from cylinder shaft centre (Lo)

Review with magnet holding force (H)

Equipped with external guide system — YES / NO

Intermediate stop? (1) — YES / NO

Intermediate stopping method — Stop with external stopper / Stop with air pressure circuit (Refer to p. 3.28-19 for intermediate stops.)

Determination of load's kinetic energy (E) — E > Es / E ≦ Es

Tentative derermination of L type $E=\frac{(W+W_B)}{2}\times\left(\frac{V}{1000}\right)^2$

Determination of pressure (P) when making intermediate stop — P > Ps / P ≦ Ps (Refer to p.3.28-19 for intermediate stops.)

Tentative determination of L type
P > Ps
Tentative determination of H type
Review of larger bore size
Tentative determination of H type

Bore size determination

Consider of order made products based on operating conditions (2) (Refer to p.5.4-1 and 5.4-79.)

Model determination

(3) WB X L1 > MD (Refer to p.3.28-19 for body non-rotating accuracy and maximum allowable moment.)

Determination of rotating moment

WB X L1 ≦ MD

(3) (Refer to p.3.28-19 for body non-rotating accuracy and maximum allowable moment.)

Determination of allowable stroke — NG / OK

Note 1) This cylinder cannot perform an intermediate stop using an air pressure circuit in vertical operation. In this case, an intermediate stop can be Performed only by using an external stopper, etc.
Note 2) Depending on the opeating environment, etc., order made products should also be considered.
Note 3) An external guide system should be installed when above specifications.

# How to Select ②

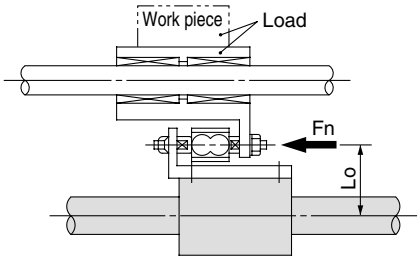
## Precautions on Design ①

### Selection procedure

① Find the drive resisting force Fn (N) when moving the load horizontally.

② Find the distance Lo (cm) from the point of the load where driving force is applied, to the centre of the cylinder shaft.

③ Select the bore size and magnet holding force (types H, L) from Lo and Fn based on data A.



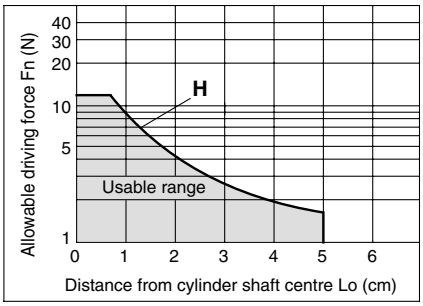

### Selection example

Given a load drive resisting force of Fn = 100 (N) and distance from the cylinder shaft centre to the load application point of Lo = 8cm, find the intersection point by extending upward from the horizontal axis of data A where the distance from the shaft centre is 8cm, and then extending to the side, find the allowable driving force on the vertical axis.

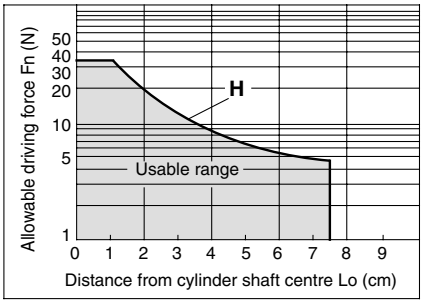
Models suitable to satisfy the requirement of 100 (N) are **CY1B32H** or **CY1B40H, CY1B40L.**

**<Data A: Distance from cylinder shaft centre —Allowable driving capacity>**

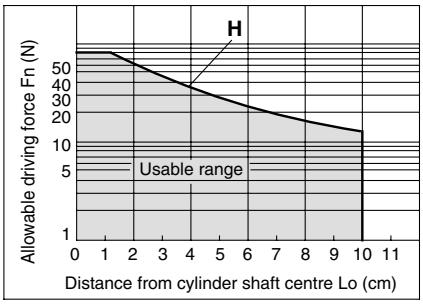
### CY1R6



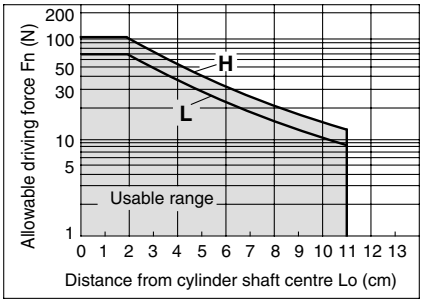

### CY1R10



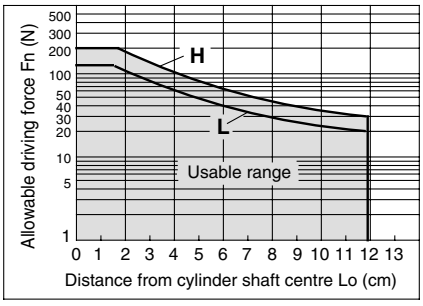

### CY1R15



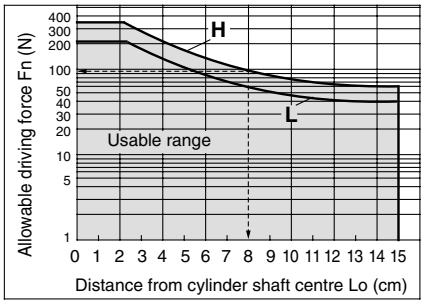

### CY1R20



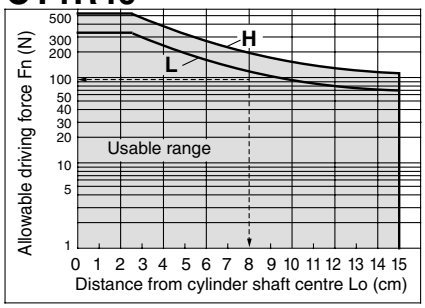

### CY1R25



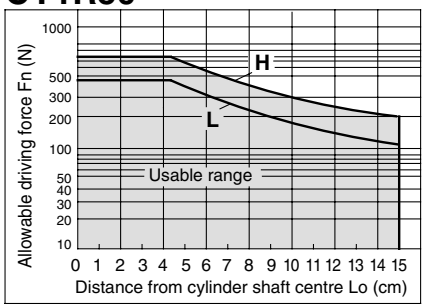

### CY1R32



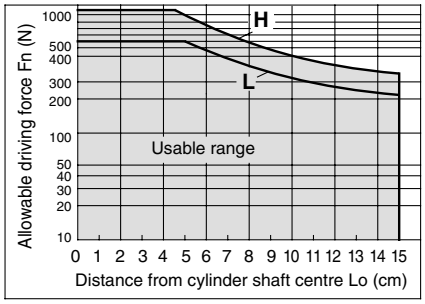

### CY1R40




### CY1R50




### CY1R63

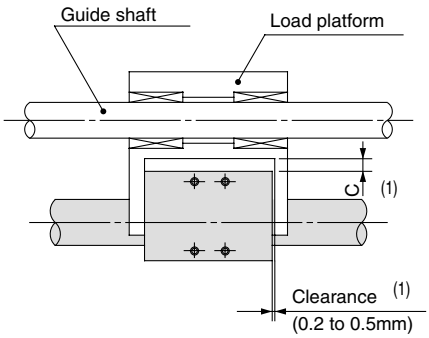


# How to Select ③

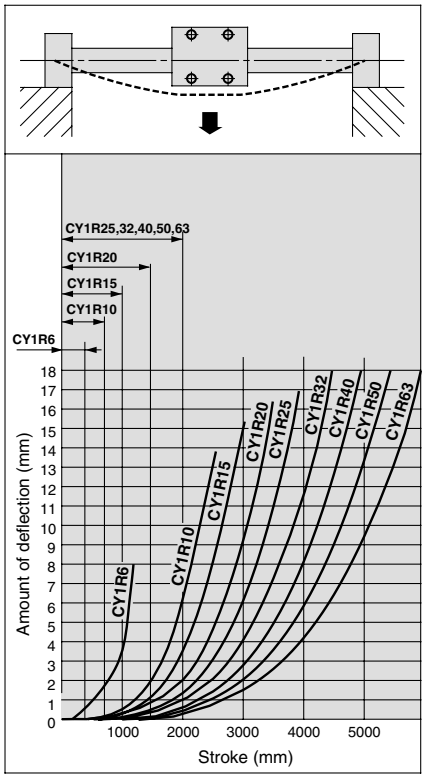
## Precautions on Design ②

### Cylinder Dead Weight Deflection

When the cylinder is mounted horizontally, deflection occurs due to its own weight as shown in the data, and the longer the stroke is, the greater the amount of variation in the shaft centre.



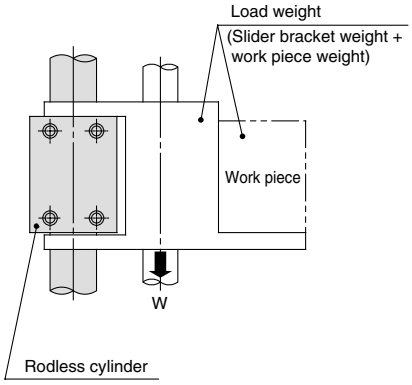

Note 1) Referring to the self weight deflection in the figure below, provide clearance so that the cylinder does not touch the mounting surface or the load, etc., and is able to operate smoothly within the minimum operating pressure range for a full stroke.




* The above deflection data indicate values when the external slider has moved to the middle of the stroke.

### Vertical Operation

The load should be guided by a ball style bearing (LM guide, etc.). If a slide bearing is used, sliding resistance increases due to the load weight and load moment, which can cause malfunction.



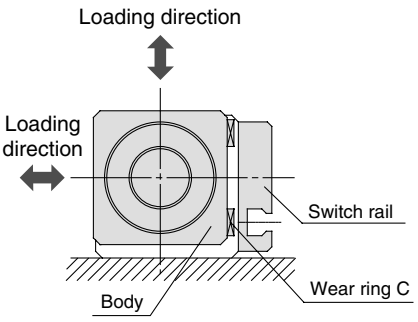

| Bore size (mm) | Model | Allowable load weight (Wv) (kg) | Max. operating press (Pv) (MPa) |
|---|---|---|---|
| 6 | CY1R 6H | 1.0 | 0.55 |
| 10 | CY1R10H | 2.7 | 0.55 |
| 15 | CY1R15H | 7.0 | 0.65 |
| 20 | CY1R20H | 11.0 | 0.65 |
| | CY1R20L | 7.0 | 0.40 |
| 25 | CY1R25H | 18.5 | 0.65 |
| | CY1R25L | 11.2 | 0.40 |
| 32 | CY1R32H | 30.0 | 0.65 |
| | CY1R32L | 18.2 | 0.40 |
| 40 | CY1R40H | 47.0 | 0.65 |
| | CY1R40L | 29.0 | 0.40 |
| 50 | CY1R50H | 75.0 | 0.65 |
| | CY1R50L | 44.0 | 0.40 |
| 63 | CY1R63H | 115.0 | 0.65 |
| | CY1R63L | 70.0 | 0.40 |

Note) Use caution, as there is a danger of breaking the magnetic coupling if operated above the maximum operating pressure.

### Max. Load Weight when Loaded Directly on Body

When the load is applied directly to the body, it should be no greater than the maximum values shown in the table below.

| Model | Max. load weight ($W_{Bmax}$) (kg) |
|---|---|
| CY1R 6H | 0.2 |
| 10H | 0.4 |
| 15H | 1.0 |
| 20□ | 1.1 |
| 25□ | 1.2 |
| 32□ | 1.5 |
| 40□ | 2.0 |
| 50□ | 2.5 |
| 63□ | 3.0 |



**Precautions on Design ③**

## Intermediate Stops

### (1) Intermediate stops of load with an external stopper, etc.

When stopping a load in mid-stroke using an external stopper, etc., operate within the operating pressure limits shown in the table below. Use caution, as operation at a pressure exceeding these limits can break the magnetic coupling.

| Bore size (mm) | Model | Operating pressure limit for intermediate stop (Ps) (MPa) |
|---|---|---|
| 6 | CY1R 6H | 0.55 |
| 10 | CY1R10H | 0.55 |
| 15 | CY1R15H | 0.65 |
| 20 | CY1R20H | 0.65 |
| | CY1R20L | 0.40 |
| 25 | CY1R25H | 0.65 |
| | CY1R25L | 0.40 |
| 32 | CY1R32H | 0.65 |
| | CY1R32L | 0.40 |
| 40 | CY1R40H | 0.65 |
| | CY1R40L | 0.40 |
| 50 | CY1R50H | 0.65 |
| | CY1R50L | 0.40 |
| 63 | CY1R63H | 0.65 |
| | CY1R63L | 0.40 |

### (2) Intermediate stops of load with an air pressure circuit

When performing an intermediate stop of a load using an air pressure circuit, operate at or below the kinetic energy shown in the table below. Use caution, as operation when exceeding the allowable value can break the magnetic coupling.

**(Reference values)**

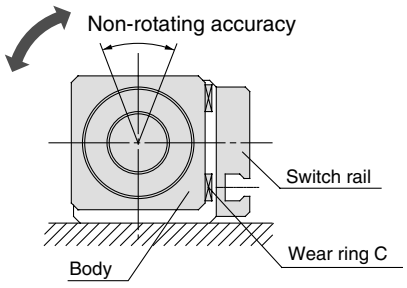
| Bore size (mm) | Model | Allowable kinetic energy for intermediate stop (Es) (J) |
|---|---|---|
| 6 | CY1R 6H | 0.007 |
| 10 | CY1R10H | 0.03 |
| 15 | CY1R15H | 0.13 |
| 20 | CY1R20H | 0.24 |
| | CY1R20L | 0.16 |
| 25 | CY1R25H | 0.45 |
| | CY1R25L | 0.27 |
| 32 | CY1R32H | 0.88 |
| | CY1R32L | 0.53 |
| 40 | CY1R40H | 1.53 |
| | CY1R40L | 0.95 |
| 50 | CY1R50H | 3.12 |
| | CY1R50L | 1.83 |
| 63 | CY1R63H | 5.07 |
| | CY1R63L | 3.09 |

## Body Non-rotating Accuracy and Maximum Allowable Moment (with Switch Rail)

**(Reference Values)**

Reference values for non-rotating accuracy and maximum allowable moment at stroke end are indicated below.

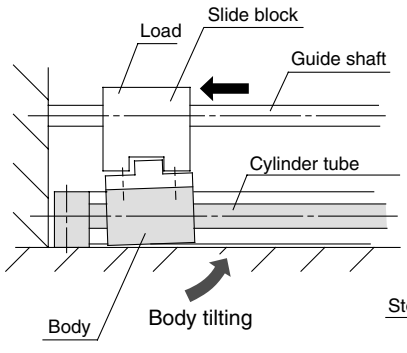
| Bore size (mm) | Non-rotating accuracy (°) | Max. allowable moment ($M_D$) (Nm) | Allowable[(2)] stroke (mm) |
|---|---|---|---|
| 6 | 7.3 | 0.02 | 100 |
| 10 | 6.0 | 0.05 | 100 |
| 15 | 4.5 | 0.15 | 200 |
| 20 | 3.7 | 0.20 | 300 |
| 25 | 3.7 | 0.25 | 300 |
| 32 | 3.1 | 0.40 | 400 |
| 40 | 2.8 | 0.62 | 400 |
| 50 | 2.4 | 1.00 | 500 |
| 63 | 2.2 | 1.37 | 500 |

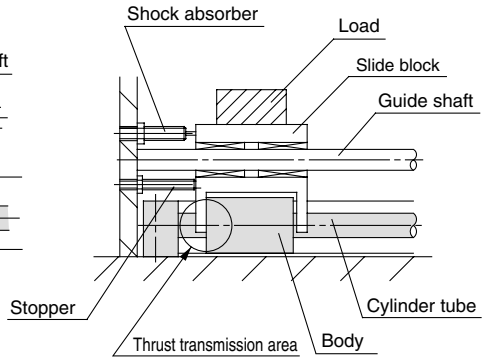



Note 1) Avoid operations where rotational torque (moment) is applied. In such cases, the use of an external guide is recommended.
Note 2) The above reference values will be satisfied within the allowable stroke ranges, but caution is necessary, because as the stroke becomes longer, the inclination (rotation angle) within the stroke can be expected to increase.
Note 3) When a load is applied directly to the body, the loaded weight should be no greater than the allowable load weights on p.3.28-18.

## Stroke End Stopping Method

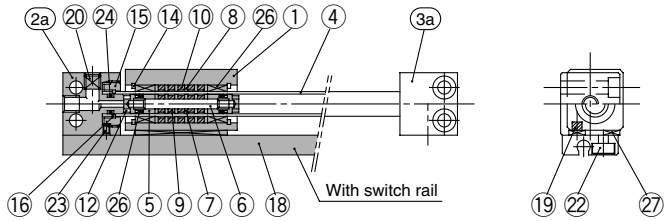
When stopping a load having a large inertial force at the stroke end, tilting of the body and damage to the bearings and cylinder tube may occur. (Refer to the left hand drawing below.)
As shown in the right hand drawing below, a shock absorber should be used together with the stopper, and thrust should also be transmitted from the centre of the body so that tilting will not occur.



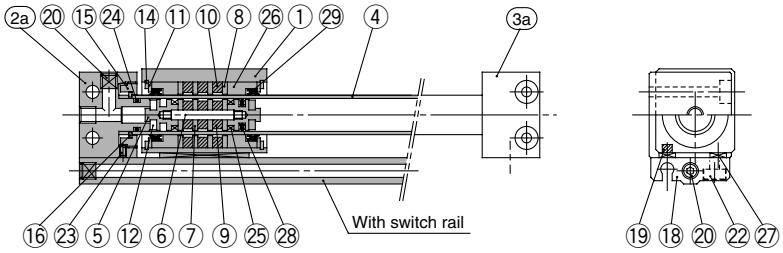



## Construction/Standard

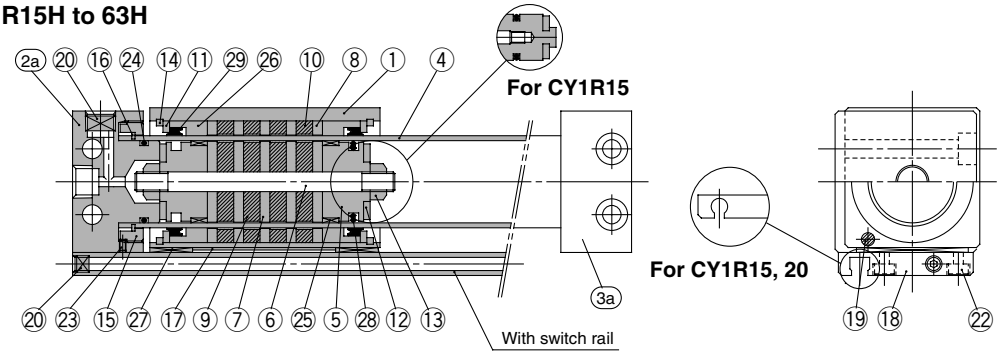
**CY1R6H**




**CY1R10H**




**CY1R15H to 63H**




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | **Body** | Aluminum alloy | Hard anodized |
| ②a | **End cover A** | Aluminum alloy | Hard anodized |
| ②b | **End cover C** | Aluminum alloy | Hard anodized |
| ③a | **End cover B** | Aluminum alloy | Hard anodized |
| ③b | **End cover D** | Aluminum alloy | Hard anodized |
| ④ | **Cylinder tube** | Stainless steel | |
| ⑤ | **Piston** | ø6 to ø15: Brass<br>ø20 to ø63: Aluminum alloy | ø6 to ø15: Electroless nickel plated ø20 to ø63: Chromated |
| ⑥ | **Shaft** | Stainless steel | |
| ⑦ | **Piston side yoke** | Rolled steel plate | Zinc chromated |
| ⑧ | **External slider side yoke** | Rolled steel plate | Zinc chromated |
| ⑨ | **Magnet A** | Rare earth magnet | |
| ⑩ | **Magnet B** | Rare earth magnet | |
| ⑪ | **Spacer** | Rolled steel plate | Nickel plated |
| ⑫ | **Bumper** | Urethane rubber | |
| ⑬ | **Piston nut** | Carbon steel | ø20 to ø63 |
| ⑭ | **Snap ring** | Carbon tool steel | Nickel plated |
| ⑮ | **Attachment ring** | Aluminum alloy | Hard anodized |
| ⑯ | **C snap ring for shaft** | ø10, ø25, ø32 Stainless steel<br>ø6, ø15, ø20, ø40, ø50, ø63 Hard steel wire | |
| ⑰ | **Magnetic shielding plat** | Rolled steel plate | Chromated |
| ⑱ | **Switch rail** | Aluminum alloy | White anodized |
| ⑲ | **Magnet** | Rare earth magnet | |
| ⑳ | **Hex socket head plug** | Chrome steel | Nickel plated |

| No. | Description | Material | Note |
|---|---|---|---|
| ㉑ | **Steel ball** | Chrome steel | ø40: Hex socket head plug<br>ø20, ø50, ø63: None |
| ㉒ | **Hexagon socket head screw** | Chrome steel | Nickel plated |
| ㉓ | **Hexagon socket head set screw** | Chrome steel | Nickel plated |
| ㉔* | **Cylinder tube gasket** | NBR | |
| ㉕* | **Wear ring A** | Special resin | |
| ㉖* | **Wear ring B** | Special resin | |
| ㉗* | **Wear ring C** | Special resin | |
| ㉘* | **Piston seal** | NBR | |
| ㉙* | **Scraper** | NBR | |
| ㉚* | **Switch rail gasket** | NBR | |

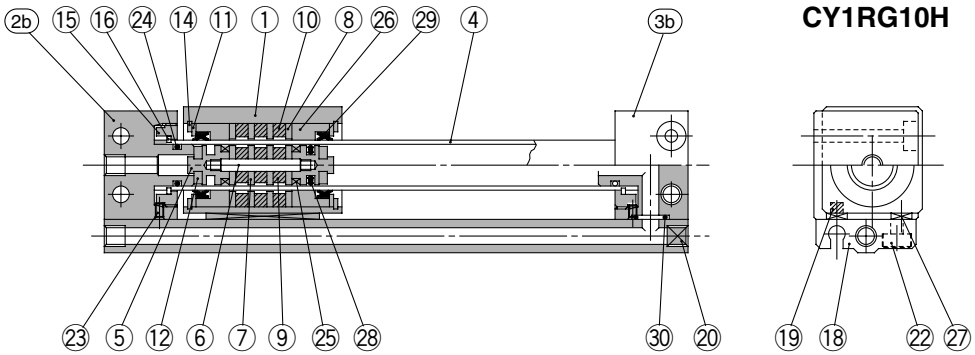
### Replacement Parts: Seal Kits

| Bore size (mm) | Kit No. | Content |
|---|---|---|
| **6** | CY1R 6 -PS | Nos. ㉔, ㉖, ㉗, ㉘ above |
| **10** | CY1R10-PS | Nos. ㉔, ㉕, ㉖, ㉗, ㉘, ㉙, ㉚ above |
| **15** | CY1R15-PS | |
| **20** | CY1R20-PS | |
| **25** | CY1R25-PS | |
| **32** | CY1R32-PS | |
| **40** | CY1R40-PS | |
| **50** | CY1R50-PS | |
| **63** | CY1R63-PS | |

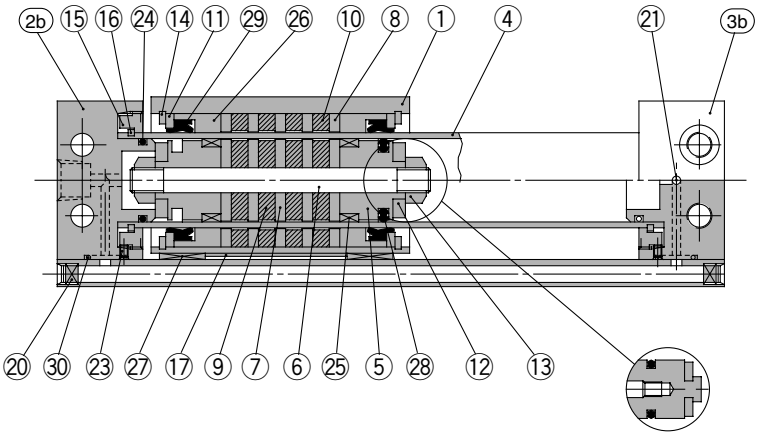
* Seal kits are sets consisting of items ㉔, ㉖, ㉗ and ㉘ for the bore ø6 and items ㉔ to ㉚ for the bore ø10 to ø63, and can be ordered using the order number for each bore size.

## Construction/Centralized Piping

Note) Centralized piping is not available for ø6.

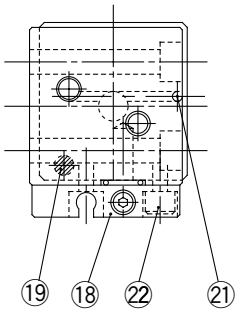



**CY1RG10H**

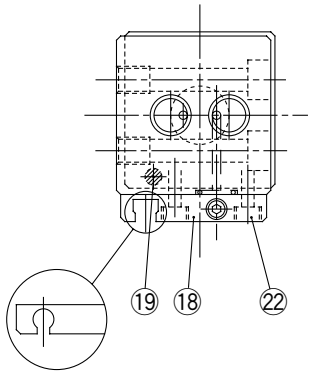



**For CY1RG15**

**CY1RG15H**




**CY1RG20H to 63H**




**For CY1RG20**

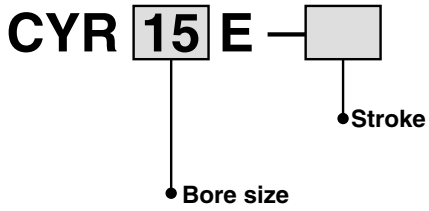
### Replacement Parts: Seal Kits

| Bore size (mm) | Kit No. | Content |
|---|---|---|
| **10** | CY1R10-PS | Nos. ㉔, ㉕, ㉖, ㉗, ㉘, ㉙, ㉚ at the left |
| **15** | CY1R15-PS | |
| **20** | CY1R20-PS | |
| **25** | CY1R25-PS | |
| **32** | CY1R32-PS | |
| **40** | CY1R40-PS | |
| **50** | CY1R50-PS | |
| **63** | CY1R63-PS | |

∗ Seal kits are the sets consisting of items ㉔ to ㉚ , and can be ordered using the order number for each bore size.

∗ Seal kits are the same for both the standard and the centralized piping style.

## Switch Rail Accessory




### Switch Rail Accessory Kits

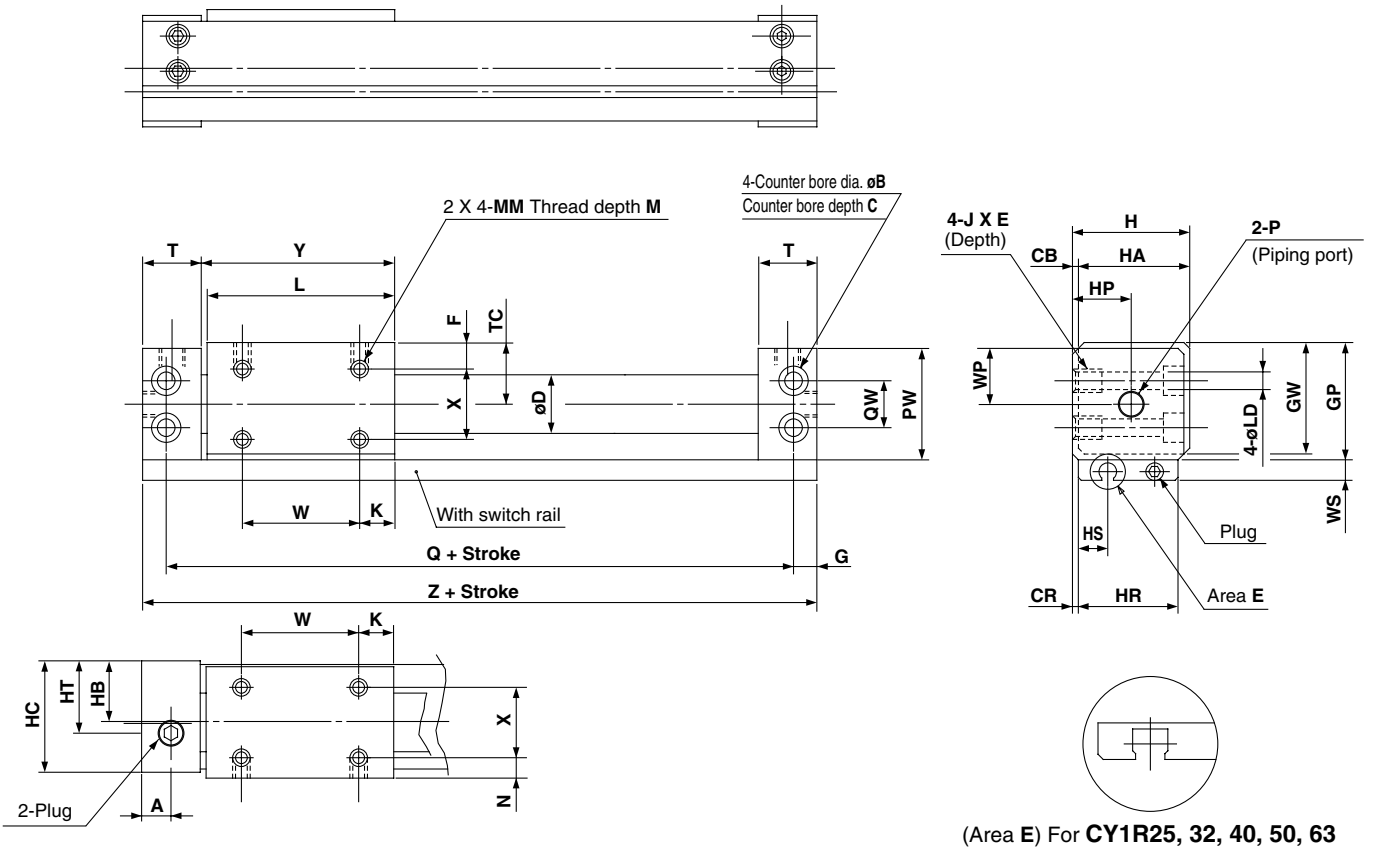
| Bore size (mm) | | Kit No. | Content |
|---|---|---|---|
| **6** | | CYR 6 E-□ | Nos. ⑱, ⑲, ㉒, ㉗ at the left |
| **10** | | CYR10E-□ | Nos. ⑱, ⑲, ⑳, ㉒, ㉗ at the left |
| **15** | | CYR15E-□ | Nos. ⑰, ⑱, ⑳, ㉒, ㉗ at the left (2) |
| **20** | Reed switch | CYR20E-□ | Nos. ⑰, ⑱, ⑲, ⑳, ㉒, ㉗ at the left |
| | Solid state switch | CYR20EN-□ | |
| **25** | | CYR25E-□ | |
| **32** | | CYR32E-□ | |
| **40** | | CYR40E-□ | |
| **50** | | CYR50E-□ | |
| **63** | | CYR63E-□ | |

Note 1) □ indicates the stroke.
Note 2) A magnet is already built-in for ø15.

## Standard: ø6 to ø63

**CY1R** [Bore size] [H / L] – [Stroke] [— / N]

Note 1) Type L is not available for ø6 to ø15.
Note 2) This drawing shows the version with switch rail (nil).




(Area **E**) For **CY1R25, 32, 40, 50, 63**

(mm)

| Model | A | B | C | CB | CR | D | F | G | GP | GW | H | HA | HB | HC | HP | HR | HS | HT | J X E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1R 6** | 9 | 6.5 | 3.2 | 2 | 0.5 | 7.6 | 5.5 | 4 | 20 | 18.5 | 19 | 17 | 10.5 | 18 | 9 | 17 | 6 | 7 | M4 X 6 |
| **CY1R10** | 9 | 6.5 | 3.2 | 2 | 0.5 | 12 | 6.5 | 4 | 27 | 25.5 | 26 | 24 | 14 | 25 | 14 | 24 | 5 | 14 | M4 X 6 |
| **CY1R15** | 10.5 | 8 | 4.2 | 2 | 0.5 | 17 | 8 | 5 | 33 | 31.5 | 32 | 30 | 17 | 31 | 17 | 30 | 8.5 | 17 | M5 X 7 |
| **CY1R20** | 9 | 9.5 | 5.2 | 3 | 1 | 22.8 | 9 | 6 | 39 | 37.5 | 39 | 36 | 21 | 38 | 24 | 36 | 7.5 | 24 | M6 X 8 |
| **CY1R25** | 8.5 | 9.5 | 5.2 | 3 | 1 | 27.8 | 8.5 | 6 | 44 | 42.5 | 44 | 41 | 23.5 | 43 | 23.5 | 41 | 6.5 | 23.5 | M6 X 8 |
| **CY1R32** | 10.5 | 11 | 6.5 | 3 | 1.5 | 35 | 10.5 | 7 | 55 | 53.5 | 55 | 52 | 29 | 54 | 29 | 51 | 7 | 29 | M8 X 10 |
| **CY1R40** | 10 | 11 | 6.5 | 5 | 2 | 43 | 13 | 7 | 65 | 63.5 | 67 | 62 | 36 | 66 | 36 | 62 | 8 | 36 | M8 X 10 |
| **CY1R50** | 14 | 14 | 8.2 | 5 | 2 | 53 | 17 | 8.5 | 83 | 81.5 | 85 | 80 | 45 | 84 | 45 | 80 | 9 | 45 | M10 X 15 |
| **CY1R63** | 15 | 14 | 8.2 | 5 | 3 | 66 | 18 | 8.5 | 95 | 93.5 | 97 | 92 | 51 | 96 | 51 | 90 | 9.5 | 51 | M10 X 15 |

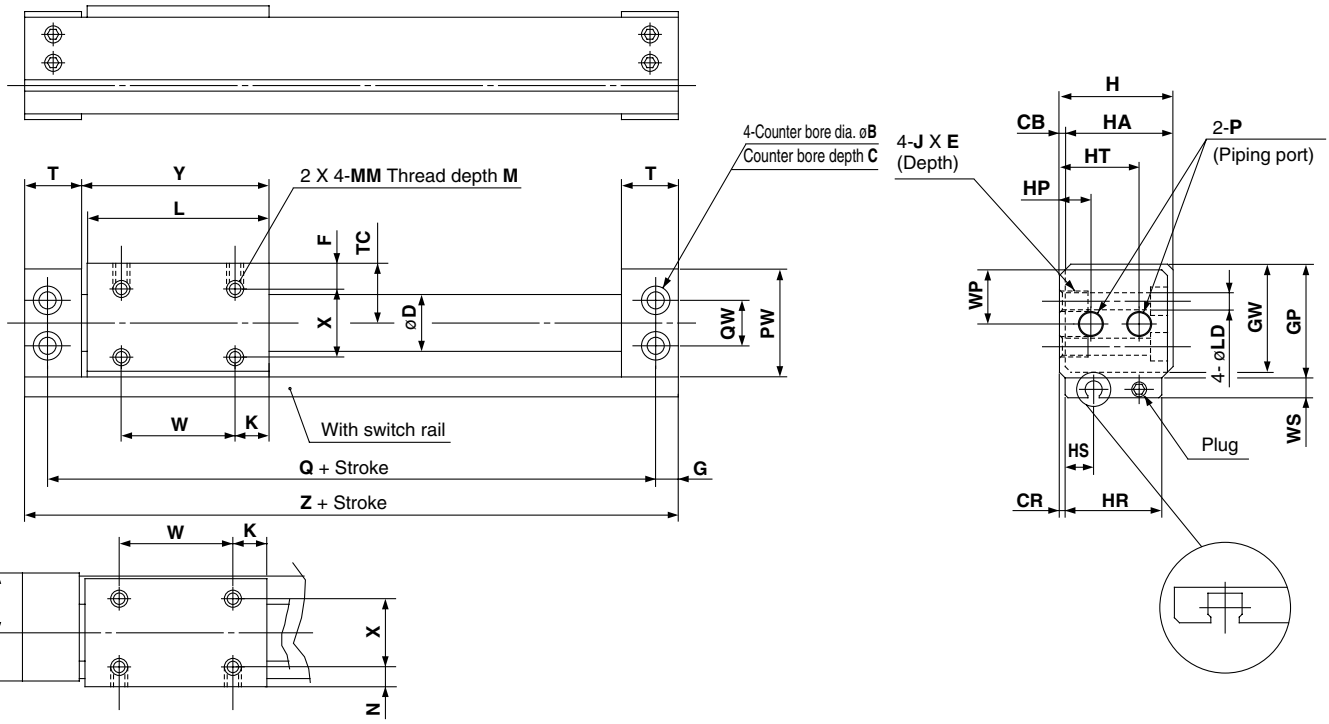
| Model | K | L | LD | M | MM | N | P | PW | Q | QW | T | TC | W | WP | WS | X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1R 6** | 7 | 34 | 3.5 | 3.5 | M3 | 3.5 | M5 | 19 | 64 | 10 | 17.5 | 10.5 | 20 | 9.5 | 6 | 10 | 35.5 | 72 |
| **CY1R10** | 9 | 38 | 3.5 | 4 | M3 | 4.5 | M5 | 26 | 68 | 14 | 17.5 | 14 | 20 | 13 | 8 | 15 | 39.5 | 76 |
| **CY1R15** | 14 | 53 | 4.3 | 5 | M4 | 6 | M5 | 32 | 84 | 18 | 19 | 17 | 25 | 16 | 7 | 18 | 54.5 | 94 |
| **CY1R20** | 11 | 62 | 5.6 | 5 | M4 | 7 | 1/8 | 38 | 95 | 17 | 20.5 | 20 | 40 | 19 | 7 | 22 | 64 | 107 |
| **CY1R25** | 15 | 70 | 5.6 | 6 | M5 | 6.5 | 1/8 | 43 | 105 | 20 | 21.5 | 22.5 | 40 | 21.5 | 7 | 28 | 72 | 117 |
| **CY1R32** | 13 | 76 | 7 | 7 | M6 | 8.5 | 1/8 | 54 | 116 | 26 | 24 | 28 | 50 | 27 | 7 | 35 | 79 | 130 |
| **CY1R40** | 15 | 90 | 7 | 8 | M6 | 11 | 1/4 | 64 | 134 | 34 | 26 | 33 | 60 | 32 | 7 | 40 | 93 | 148 |
| **CY1R50** | 25 | 110 | 8.6 | 10 | M8 | 15 | 1/4 | 82 | 159 | 48 | 30 | 42 | 60 | 41 | 10 | 50 | 113 | 176 |
| **CY1R63** | 24 | 118 | 8.6 | 10 | M8 | 16 | 1/4 | 94 | 171 | 60 | 32 | 48 | 70 | 47 | 10 | 60 | 121 | 188 |

## Centralized Piping: ø10 to ø63

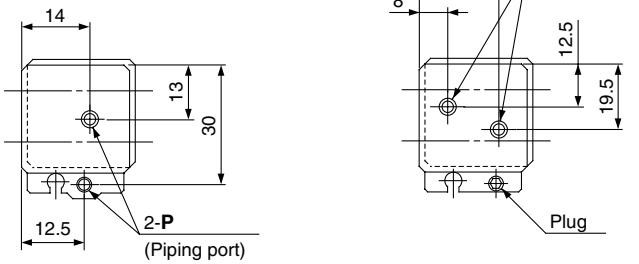
### CY1RG [Bore size] H/L – [Stroke]

Note) Type L is not available for ø10 and ø15.

**CY1RG20 to 63**




**(Area E) for CY1RG25, 32, 40, 50, 63**



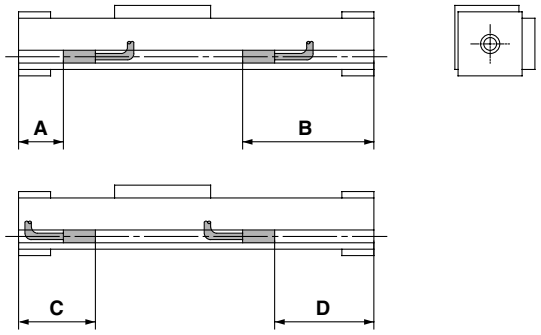

**CY1RG10** **CY1RG15**

(mm)

| Model | B | C | CB | CR | D | F | G | GP | GW | H | HA | HB | HC | HP | HR | HS | HT | J X E | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1RG10** | 6.5 | 3.2 | 2 | 0.5 | 12 | 6.5 | 4 | 27 | 25.5 | 26 | 24 | 14 | 25 | — | 24 | 5 | — | M4 X 6 | 9 |
| **CY1RG15** | 8 | 4.2 | 2 | 0.5 | 17 | 8 | 5 | 33 | 31.5 | 32 | 30 | 17 | 31 | — | 30 | 8.5 | — | M5 X 7 | 14 |
| **CY1RG20** | 9.5 | 5.2 | 3 | 1 | 22.8 | 9 | 6 | 39 | 37.5 | 39 | 36 | 21 | 38 | 11 | 36 | 7.5 | 28 | M6 X 8 | 11 |
| **CY1RG25** | 9.5 | 5.2 | 3 | 1 | 27.8 | 8.5 | 6 | 44 | 42.5 | 44 | 41 | 23.5 | 43 | 14.5 | 41 | 6.5 | 33.5 | M6 X 8 | 15 |
| **CY1RG32** | 11 | 6.5 | 3 | 1.5 | 35 | 10.5 | 7 | 55 | 53.5 | 55 | 52 | 29 | 54 | 20 | 51 | 7 | 41 | M8 X 10 | 13 |
| **CY1RG40** | 11 | 6.5 | 5 | 2 | 43 | 13 | 7 | 65 | 63.5 | 67 | 62 | 36 | 66 | 25 | 62 | 8 | 50 | M8 X 10 | 15 |
| **CY1RG50** | 14 | 8.2 | 5 | 2 | 53 | 17 | 8.5 | 83 | 81.5 | 85 | 80 | 45 | 84 | 32 | 80 | 9 | 56 | M10 X 15 | 25 |
| **CY1RG63** | 14 | 8.2 | 5 | 3 | 66 | 18 | 8.5 | 95 | 93.5 | 97 | 92 | 51 | 96 | 35 | 90 | 9.5 | 63.5 | M10 X 15 | 24 |

| Model | L | LD | M | MM | N | P | PW | Q | QW | T | TC | W | WP | WS | X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1RG10** | 38 | 3.5 | 4 | M3 | 4.5 | M5 | 26 | 68 | 14 | 17.5 | 14 | 20 | 13 | 8 | 15 | 39.5 | 76 |
| **CY1RG15** | 53 | 4.3 | 5 | M4 | 6 | M5 | 32 | 84 | 18 | 19 | 17 | 25 | 16 | 7 | 18 | 54.5 | 94 |
| **CY1RG20** | 62 | 5.6 | 5 | M4 | 7 | 1/8 | 38 | 95 | 17 | 20.5 | 20 | 40 | 19 | 7 | 22 | 64 | 107 |
| **CY1RG25** | 70 | 5.6 | 6 | M5 | 6.5 | 1/8 | 43 | 105 | 20 | 21.5 | 22.5 | 40 | 21.5 | 7 | 28 | 72 | 117 |
| **CY1RG32** | 76 | 7 | 7 | M6 | 8.5 | 1/8 | 54 | 116 | 26 | 24 | 28 | 50 | 27 | 7 | 35 | 79 | 130 |
| **CY1RG40** | 90 | 7 | 8 | M6 | 11 | 1/4 | 64 | 134 | 34 | 26 | 33 | 60 | 32 | 7 | 40 | 93 | 148 |
| **CY1RG50** | 110 | 8.6 | 10 | M8 | 15 | 1/4 | 82 | 159 | 48 | 30 | 42 | 60 | 41 | 10 | 50 | 113 | 176 |
| **CY1RG63** | 118 | 8.6 | 10 | M8 | 16 | 1/4 | 94 | 171 | 60 | 32 | 48 | 70 | 47 | 10 | 60 | 121 | 188 |

## Auto Switch Proper Mounting Position for Stroke End Detection




### ø6 to ø20

| Bore (mm) \ Auto switch model | A | | B | | C | | D | |
|---|---|---|---|---|---|---|---|---|
| | D-A9□ | D-F9□ | D-A9□ | D-F9□ | D-A9□ | D-F9□ | D-A9□ | D-F9□ |
| 6 | 26 | 30 | 46 | 42 | 46 | 42 | 26 | 30 |
| 10 | 28 | 32 | 48 | 44 | 48 | 44 | 28 | 32 |
| 15 | 17.5 | 21.5 | 76.5 | 72.5 | — | — | 56.5 | 60.5 |
| 20 | 19.5 | 23.5 | 87.5 | 83.5 | 39.5 | 35.5 | 67.5 | 71.5 |

Note) Auto switches cannot be installed in Area C in the case of ø15.

### ø25 to ø63

| Bore (mm) \ Auto switch model | A | | B | | C | | D | |
|---|---|---|---|---|---|---|---|---|
| | D-Z7□ D-Z8□ | D-Y5□ D-Y7□ D-Y7□W | D-Z7□ D-Z8□ | D-Y5□ D-Y7□ D-Y7□W | D-Z7□ D-Z8□ | D-Y5□ D-Y7□ D-Y7□W | D-Z7□ D-Z8□ | D-Y5□ D-Y7□ D-Y7□W |
| 25 | 18 | 18 | 97 | 99 | 43 | 43 | 74 | 74 |
| 32 | 21.5 | 21.5 | 108.5 | 108.5 | 46.5 | 46.5 | 83.5 | 83.5 |
| 40 | 23.5 | 23.5 | 124.5 | 124.5 | 48.5 | 48.5 | 99.5 | 99.5 |
| 50 | 27.5 | 27.5 | 148.5 | 148.5 | 52.5 | 52.5 | 123.5 | 123.5 |
| 63 | 29.5 | 29.5 | 158.5 | 158.5 | 54.5 | 54.5 | 133.5 | 133.5 |

Note) 50mm is the minimum stroke available with 2 auto switches mounted.

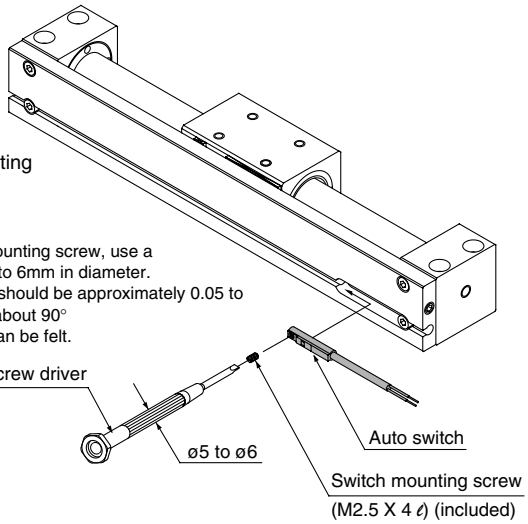
## Auto Switch Operation Range

| Bore (mm) \ Auto switch model | D-A9□ | D-F9□ | D-Z7□ D-Z8□ | D-Y5□ D-Y7□ D-Y7□W |
|---|---|---|---|---|
| 6 | 9 | 5 | — | — |
| 10 | 13 | 7 | — | — |
| 15 | 8 | 5 | — | — |
| 20 | 6 | 4 | — | — |
| 25 | — | — | 9 | 7 |
| 32 | — | — | 9 | 6 |
| 40 | — | — | 11 | 6 |
| 50 | — | — | 11 | 7 |
| 63 | — | — | 11 | 6 |

Note 1) Switches cannot be mounted in some cases.
Note 2) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment (variation on the order of ±30%).

## Auto Switch Mounting

When mounting auto switches, they should be inserted into the cyliner's switch groove from the direction shown in the drawing on the right. After setting in the mounting position, use a screw driver to tighten the mounting screw which is included.




Note) When tightening the auto switch mounting screw, use a screw driver with a handle about 5 to 6mm in diameter. Furthermore, the tightening torque should be approximately 0.05 to 0.1Nm. As a rule, it can be turned about 90° past the point at which tightening can be felt.

## Auto Switch Specifications

(1) Switches (switch rail) can be added to the standard style (without switch rail). The switch rail accessory style is mentioned on p.3.28-12 and 3.28-21 and can be ordered together with auto switches.
(2) Refer to the separate disassembly instructions for switch magnet installation procedures.

# Magnetically Coupled Rodless Cylinder/ Slider Style: Slide Bearing

# Series CY1S

## How to Order

**Slide bearing** □ **CY1S** **25** **H** — **300** □

**With auto switch** □ **CDY1S** **25** **H** — **300** □ — **A72** □

**With switch rail** (CDY1S)

**Port size** (ø20 to ø40)

| | |
|---|---|
| — | Rc(PT) |
| **E** | G(PF) |

**Slider style (slide bearing)** (CY1S)

**Bore size** (25, H)

| | | | |
|---|---|---|---|
| **6** | 6mm | **25** | 25mm |
| **10** | 10mm | **32** | 32mm |
| **15** | 15mm | **40** | 40mm |
| **20** | 20mm | | |

**Magnetic holding force** (H)

Refer to the magnet holding force table on p.3.28-27.

| | |
|---|---|
| **H** | 6 to 40 |
| **L** | 15 to 40 |

**Standard stroke** (300)

Refer to the standard stroke table on p.3.28-27.

**Stroke adjustment**

| | |
|---|---|
| **—** | With adjustment bolt |
| **B** | With shock absorber (2pcs.) |
| **BS** | With shock absorber (with plate A)<br>∗ Installed on side A at the time of shipment. |

**Auto switch** (A72)

| | |
|---|---|
| **—** | Without auto switch |

∗ Refer to the table below for applicable auto switches .

**Number of auto switches**

| | |
|---|---|
| **—** | 2 |
| **S** | 1 |
| **n** | n |

### Applicable Auto Switches/Refer to p.5.3-2 for further information on auto switch.

| Style | Special function | Electrical entry | Indicator | Wiring (output) | Load voltage DC | Load voltage DC | Load voltage AC | Auto switch model: Electrical entry direction Perp. | Auto switch model: Electrical entry direction In-line | Lead wire (m) (1) 0.5 (—) | 3 (L) | 5 (Z) | None (N) | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3 wire (Equiv. NPN) | — | 5V | — | — | **A76H** | ● | ● | — | — | IC | — |
| | | | | 2 wire | — | — | 200V | **A72** | **A72H** | ● | ● | — | — | — | Relay PLC |
| | | | | | 24V | 12V | 100V | **A73** | **A73H** | ● | ● | ● | — | | |
| | | | No | | | 5V, 12V | ≤ 100V | **A80** | **A80H** | ● | ● | — | — | IC | |
| | | Connector | Yes | | | 12V | — | **A73C** | — | ● | ● | ● | ● | — | |
| | | | No | | | 5V, 12V | ≤ 24V | **A80C** | — | ● | ● | ● | ● | IC | |
| Solid state switch | — | Grommet | Yes | 3 wire (NPN) | 24V | 5V, 12V | — | **F7NV** | **F79** | ● | ● | ○ | — | IC | Relay PLC |
| | | | | 3 wire (PNP) | | | | **F7PV** | **F7P** | ● | ● | ○ | — | | |
| | | | | 2 wire | | 12V | | **F7BV** | **J79** | ● | ● | ○ | — | — | |
| | | Connector | | | | | | **J79C** | — | ● | ● | ● | ● | | |
| | Diagnostic indication (2 colour) | Grommet | | 3 wire (NPN) | | 5V, 12V | | **F7NWV** | **F79W** | ● | ● | ○ | — | IC | |
| | | | | 3 wire (PNP) | | | | — | **F7PW** | ● | ● | ○ | — | | |
| | | | | 2 wire (NPN) | | 12V | | **F7BWV** | **J79W** | ● | ● | ○ | — | — | |
| | Water resistant (2 colour) | | | | | | | — | **F7BA** | — | ● | ○ | — | | |
| | With timer | | | 3 wire (NPN) | | 5V, 12V | | — | **F7NT** | — | ● | ○ | — | IC | |
| | With diagnostic output (2 colour) | | | 4 wire (NPN) | | | | — | **F79F** | ● | ● | ○ | — | | |
| | Latch with diagnostic output (2 colour) | | | | | — | | — | **F7LF** (3) | ● | ● | ○ | — | — | |

Note 1) Lead wire length
0.5m ····· — (Example) A80C
3m ····· L (Example) A80CL
5m ····· Z (Example) A80CZ
None ····· N (Example) A80CN

Note 2) Solid state switches marked with a "○" are manufactured upon receipt of order.

Note 3) Type D-F7LF cannot be mounted on bore sizes ø6 and ø10.

**Load can be directly mounted**
**Strokes available up to 1500mm**
**Long life with no external leakage**
**With auto switches and shock absorbers**

## Models

| Style | Bearing style | Model | Bore size (mm) | Auto switch model | Adjustment style |
|---|---|---|---|---|---|
| Slider style | Slide bearing | **CY1S** | 6, 10, 15, 20, 25, 32, 40 | D-A7, A8<br>D-F7, J7 | With adjustment bolt<br>With shock absorber |

## Specifications

| | |
|---|---|
| **Fluid** | Air |
| **Proof pressure** | 1.05MPa |
| **Max. operating pressure** | 0.7MPa |
| **Min. operating pressure** | 0.18MPa |
| **Ambient & fluid temperature** | –10 to 60°C |
| **Piston speed*** | 50 to 400mm/s |
| **Cushion** | Rubber bumpers at both ends |
| **Lubrication** | Non-lube |
| **Stroke length tolerance** | 0 to 250st: $^{+1.0}_{0}$, 251 to 1000st: $^{+1.4}_{0}$, 1001st to: $^{+1.8}_{0}$ |
| **Mounting orientation** | Unrestricted |

* In the case of a model with auto switch (CDY1S) where an auto switch is mounted at an intermediate position, the maximum detectable piston speed is controlled by the response time of the load (relays, sequence controller, etc.).

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) | Maximum available stroke (mm) |
|---|---|---|
| **6** | 50, 100 ,150 ,200 | 300 |
| **10** | 50, 00, 150, 200, 250, 300 | 500 |
| **15** | 50, 100, 150, 200, 250, 300, 350<br>400, 450, 500 | 750 |
| **20** | 100, 150, 200, 250, 300, 350<br>400, 450, 500, 600, 700, 800 | 1000 |
| **25** | | 1500 |
| **32** | | |
| **40** | 100, 150, 200, 250, 300, 350<br>400, 450, 500, 600, 700, 800<br>900, 1000 | 1500 |

## Made to Order

Refer to p.5.4-1 regarding series CY1S made to order.

## Principal Materials

| Description | Material | Mote |
|---|---|---|
| Plate A, B | Aluminum alloy | Hard anodized |
| Cylinder tube | Stainless steel | — |
| Guide shaft A, B | Carbon steel | Hard chrome plated |
| Magnet | Rare earth magnet | — |
| Slide block | Aluminum alloy | Hard anodized |

## Magnetic Holding Force (N)

| Bore size (mm) | | 6 | 10 | 15 | 20 | 25 | 32 | 40 |
|---|---|---|---|---|---|---|---|---|
| Holding force style | **H type** | 19.6 | 53.9 | 137 | 231 | 363 | 588 | 922 |
| | **L type** | — | — | 81.4 | 154 | 221 | 358 | 569 |

## Stroke Adjustment with Adjustment Bolt and Shock Absorber

| Bore size (mm) | Adjustment bolt (both sides) (mm) | Shock absorber (mm) | |
|---|---|---|---|
| | | Plate A side | Plate B side |
| **6** | 12 | 17 | 11 |
| **10** | 11 | 14 | 6 |
| **15** | 7 | 14 | 4 |
| **20** | 11 | 36 | 27 |
| **25** | 10 | 12 | 3 |
| **32** | 11 | 33 | 23 |
| **40** | 9 | 32 | 17 |

* Since the cylinder is in an intermediate stop condition when stroke adjustment is performed, use caution regarding the operating pressure and the kinetic energy of the load.

## Weight

(kg)

| No. of magnets \ Bore size (mm) | | 6 | 10 | 15 | 20 | 25 | 32 | 40 |
|---|---|---|---|---|---|---|---|---|
| Basic | **CY1S□H** | 0.27 | 0.48 | 0.91 | 1.48 | 1.84 | 3.63 | 4.02 |
| | **CY1S□L** | —— | —— | 0.85 | 1.37 | 1.75 | 3.48 | 3.84 |
| Additional weight per 50mm of stroke | | 0.044 | 0.074 | 0.104 | 0.138 | 0.172 | 0.267 | 0.406 |

Calculation example: CY1S32H-500
Basic weight ····· 3.63kg Additional weight ····· 0.267/50st Cylinder stroke ····· 500st
3.63 + 0.267 X 500 ÷ 50 = 6.3kg

### With shock absorber

Refer to p.3.28-35 for details regarding Series CY1S with shock absorber.

# ⚠ Precautions

**Be sure to read before handling. Refer to p.0-39 to 0-43 for Safety Instructions and actuator precautions.**

## Operation

### ⚠Warning

**① Use caution in the space between the plates and the slide block.**

Take sufficient care as fingers and hands, etc. may be injured if caught while the cylinder is in operation.

**② Do not apply a load to a cylinder which is greater than the allowable value in the selection data.**

## Mounting

### ⚠Caution

**① Avoid operation with the external slider fixed to a mounting surface.**

The cylinder should be operated with the plates fixed to a mounting surface.

**② Perform mounting so that the external slider will operate through the entire stroke at the minimum operating pressure.**

If the mounting surface is not flat, the guides will be warped, increasing the minimum operating pressure and causing premature wear of the bearings. Therefore, mounting should be performed so that the external slider will operate through the entire stroke at the minimum operating pressure.
A mounting surface with a high degree of flatness is desired, but in cases where this cannot be adaquately confirmed, shim adjustment, etc. should be performed.

## Disassembly & Maintenance

### ⚠Warning

**① Use caution as the power of the magnets is very strong.**

When removing the external slider and piston slider from the cylinder tube for maintenance, etc., handle with caution, since the magnets installed in each slider have very strong attractive power.

### ⚠Caution

**① Use caution when taking off the external slider, as the piston slider will be directly attracted to it.**

When removing the external slider or piston slider from the cylinder tube, first force the sliders out of their magnetically coupled positions and then remove them individually when there is no longer any holding force. If they are removed when still magnetically coupled, they will be directly attracted to one another and will not come apart.

**② Since the magnetic holding force can be changed (for example, from CY1S25L to CY1S25H), contact SMC if this is necessary.**

**③ Do not disassemble the magnetic components (piston slider, external slider).**

This can cause a loss of holding force and malfunction.

**④ When disassembling to replace the seals and wear ring, refer to the separate disassembly instructions.**

**⑤ Note the direction of the external slider and piston slider.**

Since the external slider and piston slider are directional for ø6, ø10 and holding force type L, refer to the drawings below when performing disassembly or maintenance. Put the external slider and piston slider together, and insert the piston slider into the cylinder tube so that they will have the correct positional relationship as shown in Figure 1. If they align as shown in Figure 2, insert the piston slider after turning it around 180°. If the direction is not correct, it will be impossible to obtain the specified holding force.

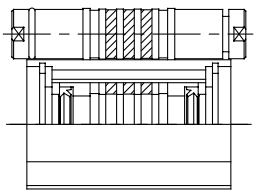


**Figure 1. Correct position**

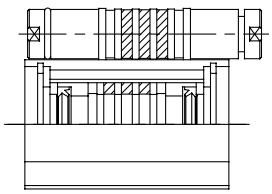


**Figure 2. Incorrect position**

Example for ø15 with holding power type L

# How to Select ①

**E**: Kinetic energy of load(J)

$$E=\frac{W}{2}\times\left(\frac{V}{1000}\right)^2$$

**Es**: Allowable kinetic energy for intermediate stop using an air pressure circuit (J)
**Ps**: Operating pressure limit for intermediate stop using an external stopper, etc. (MPa)
**Pv**: Maximum operating pressure for vertical operation (Mpa)
**WA**: Allowable load weight based on these operating conditions (kg)
**Wv**: Allowable load weight for vertical operation (kg)
**σ**: Stroke coefficient

$$\sigma=\frac{\text{Load weight within stroke}}{\text{Maximum load weight}}$$

**Operating conditions**

- W: Load weight (kg)
- V: Speed (mm/s)
- P: Operating pressure (MPa)
- Stroke (mm)
- Lo: Distance from slide block mounting surface to work piece centre of gravity (cm)
- Mode of operation (horizontal, inclined, vertical)

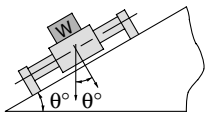
Mode of operation

Horizontal operation | Inclined operation | Vertical operation (1)

First tentative bore size determination
$\varnothing D \geqq 2.8 \times \sqrt{\frac{W}{P}}$

First tentative bore size determination
$\varnothing D \geqq 5.0 \times \sqrt{\frac{0.3 \times W\cos\theta + W\sin\theta}{P}}$

First tentative bore size determination
$\varnothing D \geqq 5.0 \times \sqrt{\frac{0.3 \times W + W}{P}}$



Inclined operation

Review of load weight and operating pressure

Determination of allowable load weight & pressure
W>Wv
P>Pv
(Refer to p.3.28-32 for vertical operation.)
W≦ Wv
P ≦Pv

(Refer to p.3.28-30 for method to find σ.)

Calculate stroke coefficient ( σ ) with stroke and tentatively determined bore size

$\sigma=\frac{\text{Load weight within stroke}}{\text{Maximum load weight}}$

Select an example calculation for allowable weight based on cylinder mounting orientation

(Refer to p.3.28-30 and 3.28-31)

Calculate ($W_A$) from the formula for the tentatively determined bore size
W>WA
Review of bore size, stroke and Lo

W≦ WA

Review with magnet holding force (H)

Intermediate stop? (1)
Yes
No

Intermediate stopping method
Stop with external stopper
Stop with air pressure circuit
(Refer to p.3.28-32 for intermediate stops.)

Determination of load's kinetic energy (E)
E>Es
E≦Es
Tentative determination of L type

Determination of pressure (P) when making intermediate stop
$E=\frac{W}{2}\times\left(\frac{V}{1000}\right)^2$
P>Ps
P≦Ps
E>Es
Tentative determination of L type
(Refer to p.3.28-32 for intermediate stops.)
P>Ps
Tentative determination of H type

Review of larger bore size
Tentative determination of H type

Bore size determination

Consider products made to order based on operating conditions (2)
(Refer to p.5.4-1 and 5.4-79)

Model determination

Note 1) This cylinder cannot perform an intermediate stop using an air pressure circuit in vertical operation. In this case, an intermediate stop can be performed only by using an external stopper, etc.
Note 2) Depending on the operating environment, etc., products made to order should also be considered.

# Series CY1S
# How to Select ②

**Precautions on Design ①**

## How to Find σ when Selecting the Allowable Load Weight

Since the maximum load weight with respect to the cylinder stroke changes as shown in the table below, σ should be considered as a coefficient determined in accordance with each stroke.

Example) CY1S25□–650

(1) Maximum load weight=20kg

(2) Load weight for 650 st =13.6kg

(3) $\sigma = \frac{13.6}{20}$ =0.68 is the result.

### Calculation formula for σ ( σ ≦ 1)

ST: Stroke (mm)

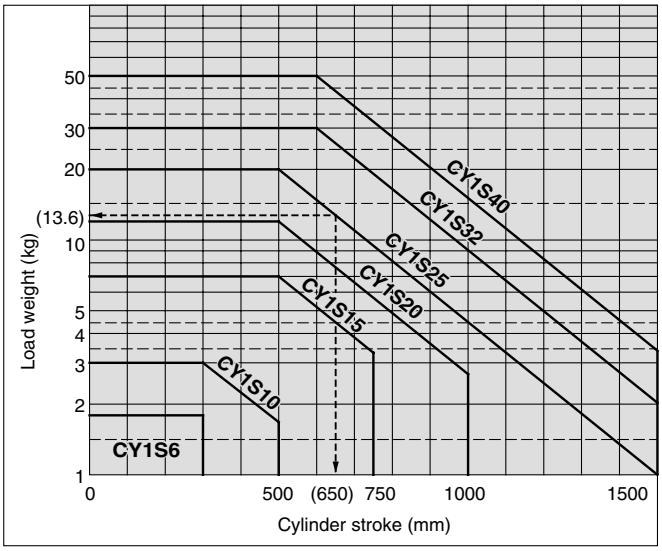
| Model | CY1S6 | CY1S10 |
|---|---|---|
| σ= | 1 | $\frac{10^{(0.86 - 1.3 \times 10^{-3} \times ST)}}{3}$ |

| Model | CY1S15 | CY1S20 |
|---|---|---|
| σ= | $\frac{10^{(1.5 - 1.3 \times 10^{-3} \times ST)}}{7}$ | $\frac{10^{(1.71 - 1.3 \times 10^{-3} \times ST)}}{12}$ |

| Model | CY1S25 | CY1S32 |
|---|---|---|
| σ= | $\frac{10^{(1.98 - 1.3 \times 10^{-3} \times ST)}}{20}$ | $\frac{10^{(2.26 - 1.3 \times 10^{-3} \times ST)}}{30}$ |

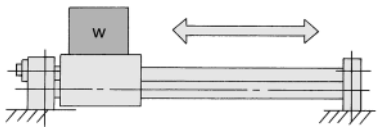
| Model | CY1S40 |
|---|---|
| σ= | $\frac{10^{(2.48 - 1.3 \times 10^{-3} \times ST)}}{50}$ |

Note) Calculate with σ=1 for all applications up to ø10-300 mmST, ø15-500mmST, ø20-500mmST, ø25-500mmST, ø32-600mmST and ø40-600mmST.




## Examples of Allowable Load Weight Calculation Based on Cylinder Mounting Orientation

### 1. Horizontal operation (floor mounting)

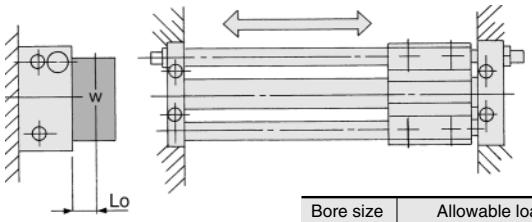



Maximum load weight (centre of slide block) (kg)

| Bore (mm) | 6 | 10 | 15 | 20 | 25 | 32 | 40 |
|---|---|---|---|---|---|---|---|
| Max. load weight (kg) | 1.8 | 3 | 7 | 12 | 20 | 30 | 50 |
| Stroke (max) | 300st | 300st | 500st | 500st | 500st | 600st | 600st |

The above maximum load weight values will change with the stroke length for each cylinder size, due to limitation from warping of the guide shafts. (Note the coefficient σ.) Moreover, depending on the operation direction, the allowable load weight may be different from the maximum load weight.

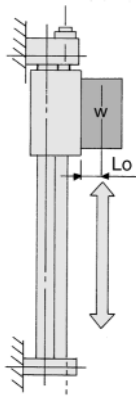
### 2. Horizontal operation (wall mounting)




Lo: Distance from mounting surface to load centre of gravity (cm)

| Bore size (mm) | Allowable load weight ($W_A$)(kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 5.44}{7 + 2Lo}$ |
| 10 | $\frac{\sigma \cdot 12.0}{8.4 + 2Lo}$ |
| 15 | $\frac{\sigma \cdot 36.4}{10.6 + 2Lo}$ |
| 20 | $\frac{\sigma \cdot 74.4}{12 + 2Lo}$ |
| 25 | $\frac{\sigma \cdot 140}{13.8 + 2Lo}$ |
| 32 | $\frac{\sigma \cdot 258}{17 + 2Lo}$ |
| 40 | $\frac{\sigma \cdot 520}{20.6 + 2Lo}$ |

### 3. Vertical operation




| Bore size (mm) | Allowable load weight ($W_A$)(kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 1.33}{1.9 + Lo}$ |
| 10 | $\frac{\sigma \cdot 4.16}{2.2 + Lo}$ |
| 15 | $\frac{\sigma \cdot 13.23}{2.7 + Lo}$ |
| 20 | $\frac{\sigma \cdot 26.8}{2.9 + Lo}$ |
| 25 | $\frac{\sigma \cdot 44.0}{3.4 + Lo}$ |
| 32 | $\frac{\sigma \cdot 88.2}{4.2 + Lo}$ |
| 40 | $\frac{\sigma \cdot 167.8}{5.1 + Lo}$ |

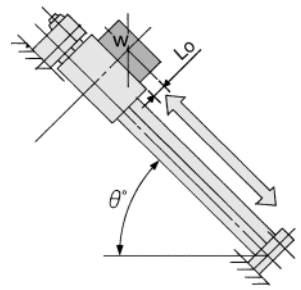
Lo: Distance from mounting surface to load centre of gravity (cm)
Note) A safety factor should be considered to prevent dropping.

# How to Select ③

**Precautions on Design ②**

## Examples of Allowable Load Weight Calculation Based on Cylinder Mounting Orientation

### 4. Inclined operation (in direction of operation)



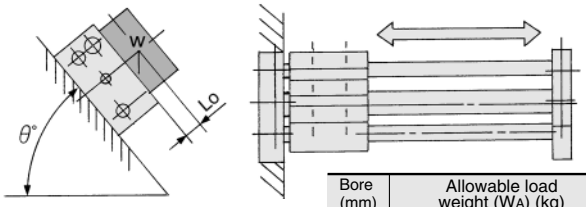

| Angle | to 45° | to 60° | to 75° | to 90° |
|---|---|---|---|---|
| k | 1 | 0.9 | 0.8 | 0.7 |

Angle coefficient (k) k= [to 45°(=θ)]=1,
[to 60°]=0.9,
[to 75°]=0.8,
[to 90°]=0.7

| Bore (mm) | Allowable load weight (WA) (kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 5.1 \cdot k}{3\cos\theta + 2(1.9 + Lo)\sin\theta}$ |
| 10 | $\frac{\sigma \cdot 10.5 \cdot k}{3.5\cos\theta + 2(2.2 + Lo)\sin\theta}$ |
| 15 | $\frac{\sigma \cdot 35 \cdot k}{5\cos\theta + 2(2.7 + Lo)\sin\theta}$ |
| 20 | $\frac{\sigma \cdot 72 \cdot k}{6\cos\theta + 2(2.9 + Lo)\sin\theta}$ |
| 25 | $\frac{\sigma \cdot 120 \cdot k}{6\cos\theta + 2(3.4 + Lo)\sin\theta}$ |
| 32 | $\frac{\sigma \cdot 210 \cdot k}{7\cos\theta + 2(4.2 + Lo)\sin\theta}$ |
| 40 | $\frac{\sigma \cdot 400 \cdot k}{8\cos\theta + 2(5.1 + Lo)\sin\theta}$ |

Lo: Distance from mounting surface to load centre of gravity (cm)

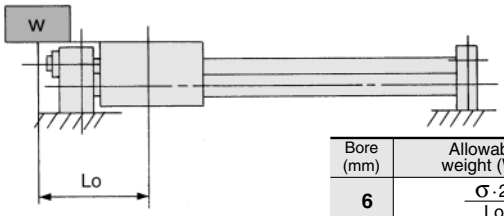
### 5. Inclined operation (at right angle to direction of operation)




Lo: Distance from mounting surface to load centre of gravity (cm)

| Bore (mm) | Allowable load weight (WA) (kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 5.44}{3.2+2(1.9+Lo)\sin\theta}$ |
| 10 | $\frac{\sigma \cdot 12.0}{4+2(2.2+Lo)\sin\theta}$ |
| 15 | $\frac{\sigma \cdot 36.4}{5.2+2(2.7+Lo)\sin\theta}$ |
| 20 | $\frac{\sigma \cdot 74.4}{6.2+2(2.9+Lo)\sin\theta}$ |
| 25 | $\frac{\sigma \cdot 140}{7+2(3.4+Lo)\sin\theta}$ |
| 32 | $\frac{\sigma \cdot 258}{8.6+2(4.2+Lo)\sin\theta}$ |
| 40 | $\frac{\sigma \cdot 520}{10.4+2(5.1+Lo)\sin\theta}$ |

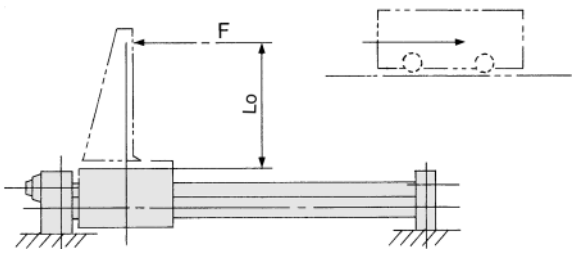
### 6. Load centre offset in operating direction (Lo)




Lo: Distance from slide block centre to load centre of gravity (cm)

| Bore (mm) | Allowable load weight (WA) (kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 2.55}{Lo+3}$ |
| 10 | $\frac{\sigma \cdot 5.25}{Lo+3.5}$ |
| 15 | $\frac{\sigma \cdot 17.5}{Lo+5.0}$ |
| 20 | $\frac{\sigma \cdot 36}{Lo+6.0}$ |
| 25 | $\frac{\sigma \cdot 60}{Lo+6.0}$ |
| 32 | $\frac{\sigma \cdot 105}{Lo+7.0}$ |
| 40 | $\frac{\sigma \cdot 200}{Lo+8.0}$ |

### 7. Horizontal operation (pushing load, pusher)

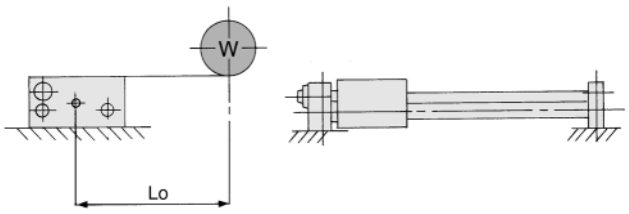



F: Drive (from slide block to position Lo) resistance force (kg)
Lo: Distance from mounting surface to load centre of gravity (cm)

| Bore (mm) | 6 | 10 | 15 | 20 |
|---|---|---|---|---|
| Allowable load weight (WA)(kg) | $\frac{\sigma \cdot 2.55}{1.9+Lo}$ | $\frac{\sigma \cdot 5.25}{2.2+Lo}$ | $\frac{\sigma \cdot 17.5}{2.7+Lo}$ | $\frac{\sigma \cdot 36}{2.9+Lo}$ |

| Bore (mm) | 25 | 32 | 40 |
|---|---|---|---|
| Allowable load weight (WA)(kg) | $\frac{\sigma \cdot 60}{3.4+Lo}$ | $\frac{\sigma \cdot 105}{4.2+Lo}$ | $\frac{\sigma \cdot 200}{5.1+Lo}$ |

### 8. Horizontal operation (load, in-line offset Lo)




Lo: Distance from mounting surface to load centre of gravity (cm)

| Bore (mm) | 6 | 10 | 15 | 20 |
|---|---|---|---|---|
| Allowable load weight (WA)(kg) | $\frac{\sigma \cdot 3.80}{3.2+Lo}$ | $\frac{\sigma \cdot 8.40}{4+Lo}$ | $\frac{\sigma \cdot 25.48}{5.2+Lo}$ | $\frac{\sigma \cdot 52.1}{6.2+Lo}$ |

| Bore (mm) | 25 | 32 | 40 |
|---|---|---|---|
| Allowable load weight (WA)(kg) | $\frac{\sigma \cdot 98}{7.0+Lo}$ | $\frac{\sigma \cdot 180}{8.6+Lo}$ | $\frac{\sigma \cdot 364}{10.4+Lo}$ |

# How to Select ④

**Precautions on Design ③**

## Vertical Operation

When operating a load vertically, it should be operated within the allowable load weight and maximum operating pressure shown in the table below.
Use caution, as operating above the prescribed values may lead to dropping of the load.

| Bore (mm) | Model | Allowable load weight (Wv) (kg) | Max. operating pressure (PV) (MPa) |
|---|---|---|---|
| 6 | CY1S 6H | 1.0 | 0.55 |
| 10 | CY1S10H | 2.7 | 0.55 |
| 15 | CY1S15H | 7.0 | 0.65 |
| | CY1S15L | 4.1 | 0.40 |
| 20 | CY1S20H | 11.0 | 0.65 |
| | CY1S20L | 7.0 | 0.40 |
| 25 | CY1S25H | 18.5 | 0.65 |
| | CY1S25L | 11.2 | 0.40 |
| 32 | CY1S32H | 30.0 | 0.65 |
| | CY1S32L | 18.2 | 0.40 |
| 40 | CY1S40H | 47.0 | 0.65 |
| | CY1S40L | 29.0 | 0.40 |

Note) Use caution, as there is a possibility of breaking the magnetic coupling if operated above the maximum operating pressure.

## Intermediate Stops

**1) Intermediate stops of load with an external stopper, etc.**
When stopping a load in mid-stroke using an external stopper (adjustment bolt, etc.), operate within the operating pressure limits shown in the table below. Use caution, as operation at a pressure exceeding these limits can break the magnetic coupling.

| Bore (mm) | Model | Operating pressure limit for intermediate stops (Ps) (MPa) |
|---|---|---|
| 6 | CY1S 6H | 0.55 |
| 10 | CY1S10H | 0.55 |
| 15 | CY1S15H | 0.65 |
| | CY1S15L | 0.40 |
| 20 | CY1S20H | 0.65 |
| | CY1S20L | 0.40 |
| 25 | CY1S25H | 0.65 |
| | CY1S25L | 0.40 |
| 32 | CY1S32H | 0.65 |
| | CY1S32L | 0.40 |
| 40 | CY1S40H | 0.65 |
| | CY1S40L | 0.40 |

**2) Intermediate stops of load with an air pressure circuit**
When stopping a load using an air pressure circuit, operate at or below the kinetic energy shown in the table below. Use caution, as operation when exceeding the allowable value can break the magnetic coupling.

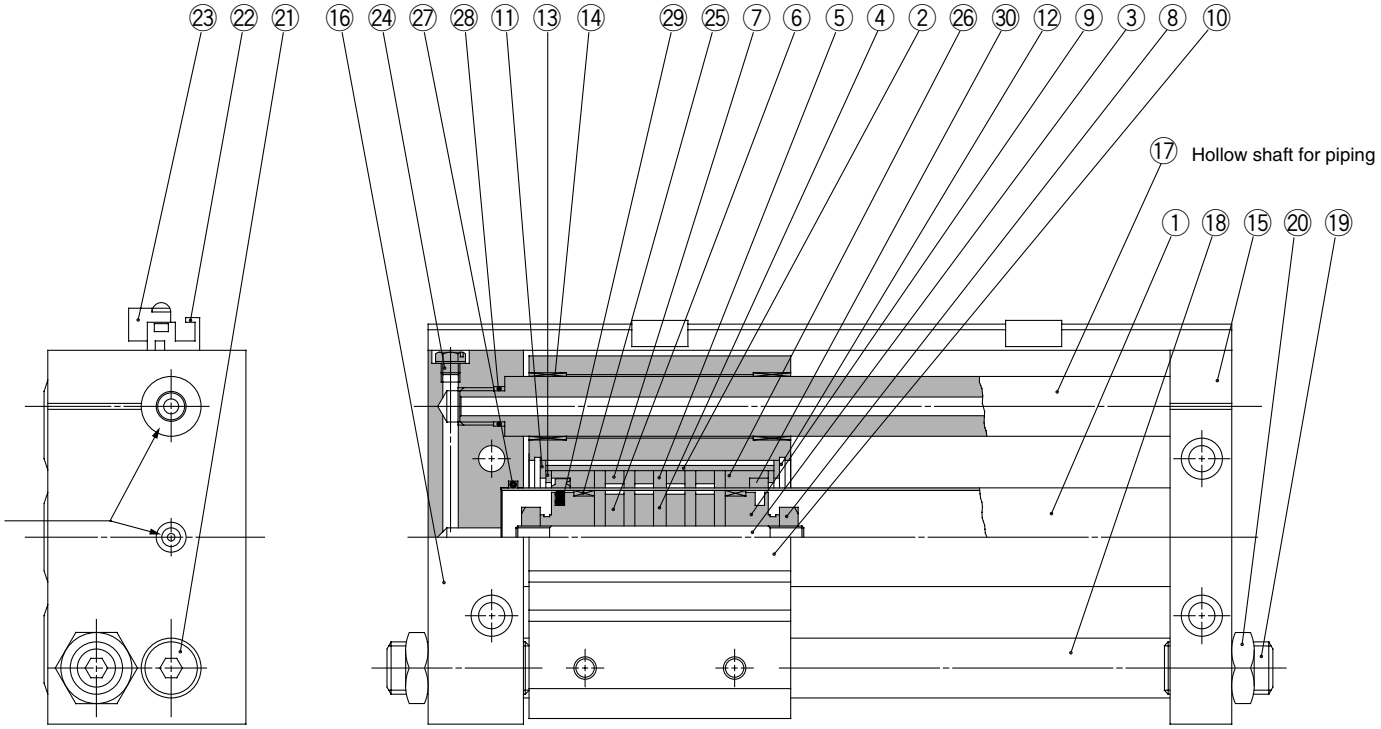
(Reference values)

| Bore (mm) | Model | Allowable kinetic energy for intermediate stops (Es) (J) |
|---|---|---|
| 6 | CY1S 6H | 0.007 |
| 10 | CY1S10H | 0.03 |
| 15 | CY1S15H | 0.13 |
| | CY1S15L | 0.076 |
| 20 | CY1S20H | 0.24 |
| | CY1S20L | 0.16 |
| 25 | CY1S25H | 0.45 |
| | CY1S25L | 0.27 |
| 32 | CY1S32H | 0.88 |
| | CY1S32L | 0.53 |
| 40 | CY1S40H | 1.53 |
| | CY1S40L | 0.95 |

## Construction

### Slider style/Slide bearing

#### CY1S6 to 40




**Component Parts**

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Stainless steel | |
| ② | External slider tube | Aluminum alloy | |
| ③ | Shaft | Stainless steel | |
| ④ | Piston side yoke | Rolled steel plate | Zinc chromated |
| ⑤ | External slider side yoke | Rolled steel plate | Zinc chromated |
| ⑥ | Magnet A | Rare earth magnet | |
| ⑦ | Magnet B | Rare earth magnet | |
| ⑧ | Piston nut | Carbon steel | Zinc chromated |
| ⑨ | Piston | Aluminum alloy (1) | Chromated |
| ⑩ | Slide block | Aluminum alloy | Hard anodized |
| ⑪ | Slider spacer | Rolled steel plate | Nickel plated |
| ⑫ | Snap ring | Carbon tool steel | Nickel plated |
| ⑬ | Spacer | Rolled steel plate | Nickel plated |
| ⑭ | Bushing | Oil retaining bearing material | |
| ⑮ | Plate A | Aluminum alloy | Hard anodized |
| ⑯ | Plate B | Aluminum alloy | Hard anodized |
| ⑰ | Guide shaft A | Carbon steel | Hard chrome plated |
| ⑱ | Guide shaft B | Carbon steel | Hard chrome plated |
| ⑲ | Adjustment bolt | Chrome molybdenum steel | |
| ⑳ | Hexagon nut | Carbon steel | |
| ㉑ | Hex socket head screw | Chrome molybdenum steel | Nickel plated |
| ㉒ | Switch mounting rail | Aluminum alloy | |

Note 1) Brass for ø6, ø10, ø15

| No. | Description | Material | Note |
|---|---|---|---|
| ㉓ | Auto switch | — | |
| ㉔ | Plug | Brass | |
| ㉕* | Wear ring A | Special resin | |
| ㉖* | Wear ring B | Special resin | |
| ㉗* | Cylinder tube gasket | NBR | |
| ㉘* | Guide shaft gasket | NBR | |
| ㉙* | Piston seal | NBR | |
| ㉚* | Scraper | NBR | |

**Replacement Parts: Seal Kits**

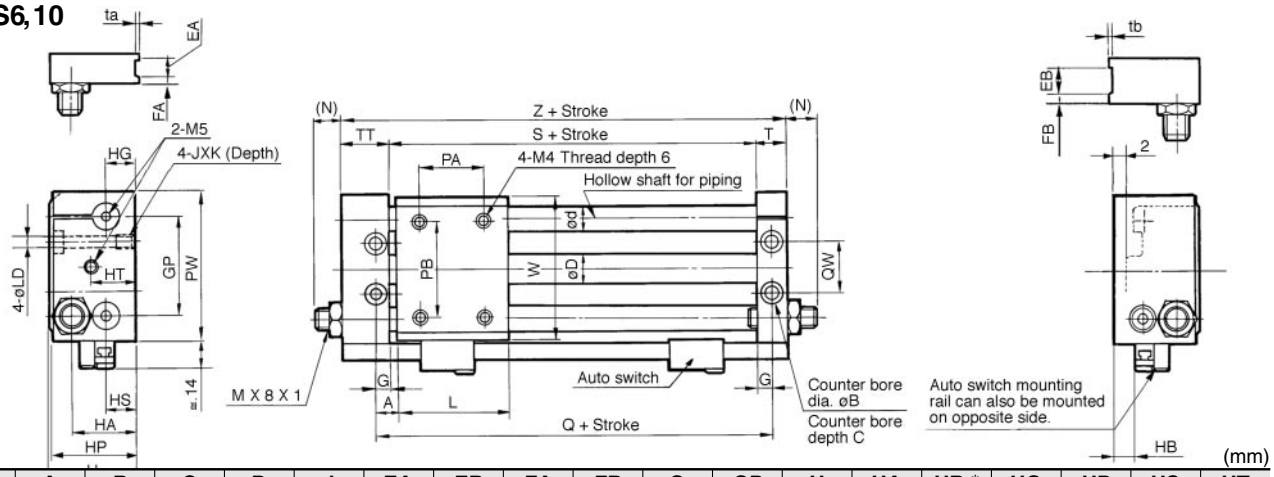
| Bore size (mm) | Kit No. | Content |
|---|---|---|
| **6** | CY1S6-PS-N | Nos. ㉖, ㉗, ㉘, ㉙ above |
| **10** | CY1S10-PS-N | Nos. ㉕, ㉖, ㉗, ㉘, ㉙, ㉚ above |
| **15** | CY1S15-PS-N | |
| **20** | CY1S20-PS-N | |
| **25** | CY1S25-PS-N | |
| **32** | CY1S32-PS-N | |
| **40** | CY1S40-PS-N | |

∗ Seal kits are sets consisting of items ㉕ through ㉚, and can be ordered using the order number for each bore size.

## Dimensions

### Slider style/Slide bearing

**C□Y1S6, 10**



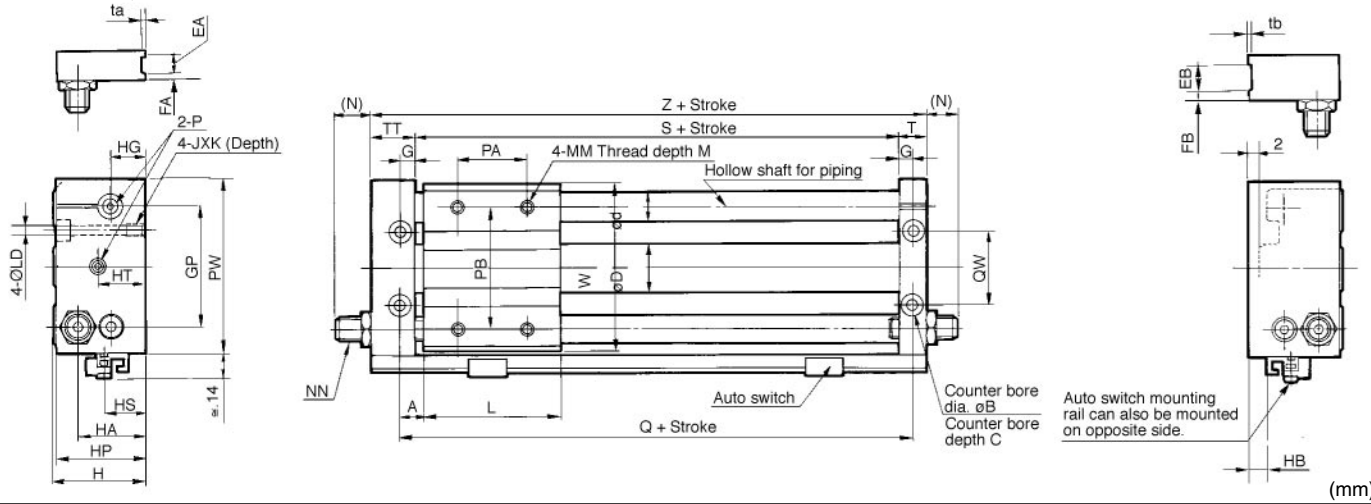

(mm)

| Model | A | B | C | D | d | EA | EB | FA | FB | G | GP | H | HA | HB * | HG | HP | HS | HT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CY1S6<br>CDY1S6 | 6 | 6.5 | 3 | 7.6 | 8 | — | — | — | — | 5 | 32 | 27 | 19 | 4 | 8 | 26 | 8 | 17 |
| CY1S10<br>CDY1S10 | 7.5 | 8 | 4 | 12 | 10 | 6 | 12 | 3 | 5 | 6.5 | 40 | 34 | 25.5 | 10 | 12 | 33 | 14 | 18 |

| Model | J X K | L | LD | (N) | PA * | PB | PW | Q | QW | S | T | TT | ta | tb | W | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CY1S6<br>CDY1S6 | M4 X 6.5 | 40 | 3.5 | 10 | 25 | 25 | 50 | 52 | 16 | 42 | 10 | 16 | — | — | 46 | 68 |
| CY1S10<br>CDY1S10 | M5 X 9.5 | 45 | 4.3 | 9.5 | 25 | 38 | 60 | 60 | 24 | 47 | 12.5 | 20.5 | 0.5 | 1.0 | 58 | 80 |

∗ PA demensions are for split from center, HB dimensions are for CDY1S.

**C□Y1S15, ø20 to ø40**




(mm)

| Model | A | B | C | D | d | EA | EB | FA | FB | G | GP | H | HA | HB * | HG | HP | HS | HT | J X K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CY1S15<br>CDY1S15 | 7.5 | 9.5 | 5 | 16.6 | 12 | 6 | 13 | 3 | 6 | 6.5 | 52 | 40 | 29 | 1 | 13 | 39 | 15 | 21 | M6 X 9.5 | 60 |
| CY1S20<br>CDY1S20 | 10 | 9.5 | 5.2 | 21.6 | 16 | — | — | — | — | 8.5 | 62 | 46 | 36 | 4.5 | 17 | 45 | 25.5 | 20 | M6 X 9.5 | 70 |
| CY1S25<br>CDY1S25 | 10 | 11 | 6.5 | 26.4 | 16 | 8 | 14 | 4 | 7 | 8.5 | 70 | 54 | 40 | 9 | 20 | 53 | 23 | 20 | M8 X 10 | 70 |
| CY1S32<br>CDY1S32 | 12.5 | 14 | 8 | 33.6 | 20 | 8 | 16 | 5 | 7 | 9.5 | 86 | 66 | 46 | 13 | 24 | 64 | 27 | 24 | M10 X 15 | 85 |
| CY1S40<br>CDY1S40 | 12.5 | 14 | 8 | 41.6 | 25 | 10 | 20 | 5 | 10 | 10.5 | 104 | 76 | 57 | 17 | 25 | 74 | 31 | 25 | M10 X 15 | 95 |

| Model | LD | M | MM | (N) | NN | P | PA * | PB | PW | Q | QW | S | T | TT | ta | tb | W | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CY1S15<br>CDY1S15 | 5.6 | 8 | M5 | 7.5 | M8 X 1.0 | M5 | 30 | 50 | 75 | 75 | 30 | 62 | 12.5 | 22.5 | 0.5 | 1 | 72 | 97 |
| CY1S20<br>CDY1S20 | 5.6 | 10 | M6 | 9.5 | M10 X 1 | 1/8 | 40 | 70 | 90 | 90 | 38 | 73 | 16.5 | 25.5 | — | — | 87 | 115 |
| CY1S25<br>CDY1S25 | 7 | 10 | M6 | 11 | M14 X 1.5 | 1/8 | 40 | 70 | 100 | 90 | 42 | 73 | 16.5 | 25.5 | 0.5 | 1 | 97 | 115 |
| CY1S32<br>CDY1S32 | 8.7 | 12 | M8 | 11.5 | M20 X 1.5 | 1/8 | 40 | 75 | 122 | 110 | 50 | 91 | 18.5 | 28.5 | 0.5 | 1 | 119 | 138 |
| CY1S40<br>CDY1S40 | 8.7 | 12 | M8 | 10.5 | M20 X 1.5 | 1/4 | 65 | 105 | 145 | 120 | 64 | 99 | 20.5 | 35.5 | 1 | 1 | 142 | 155 |

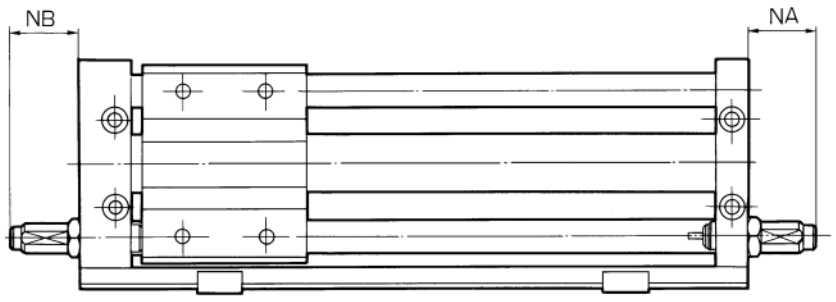
∗ PA demensions are for split from center, HB dimensions are for CDY1S.

# Shock Absorber Specifications/Series RB

| Applicable rodless cylinder | | CY1S 6 10 15 | CY1S20 | CY1S25 | CY1S 32 40 |
|---|---|---|---|---|---|
| Shock absorber model | | **RB0805** | **RB1006** | **RB1411** | **RB2015** |
| Maximum energy absorption (J) | | 0.98 | 3.92 | 14.7 | 58.8 |
| Stroke absorption (mm) | | 5 | 6 | 11 | 15 |
| Impact speed (m/s) | | 0.05 to 5 | | | |
| Max. operation frequency (cycle/min)* | | 80 | 70 | 45 | 25 |
| Ambient temperature range | | –10 to 80°C | | | |
| Spring force (N) | Extended | 1.96 | 4.22 | 6.86 | 8.34 |
| | Compressed | 3.83 | 6.18 | 15.3 | 20.50 |

* Indicates time of maximum energy absorption per cycle. Therefore, the operating frequency can be increased according to the energy absorption.

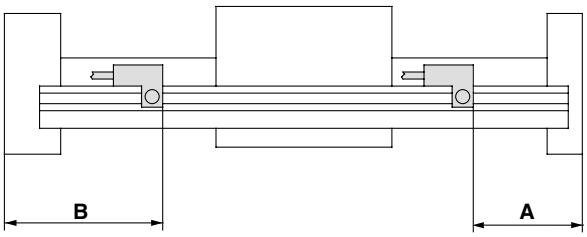
## With Shock Absorber/Dimensions




(mm)

| Model | Shock absorber | NA | NB |
|---|---|---|---|
| **C□Y1S 6** | **RB0805** | 30 | 24 |
| **C□Y1S10** | | 27 | 19 |
| **C□Y1S15** | | 27 | 17 |
| **C□Y1S20** | **RB1006** | 49 | 40 |
| **C□Y1S25** | **RB1411** | 29 | 20 |
| **C□Y1S32** | **RB2015** | 52 | 42 |
| **C□Y1S40** | | 51 | 36 |

## Auto Switch Proper Mounting Position for Stroke End Detection




(mm)

| Auto Switch model / Bore (mm) | Dimension A | | | | Dimension B | | | |
|---|---|---|---|---|---|---|---|---|
| | D-A73/A80 | D-A72<br>D-A7□H/A80H<br>D-A73C/A80C<br>D-F7□/J79<br>D-J79C<br>D-F7□V | D-F7□W/J79W<br>D-F7□WV<br>D-F7LF (2)<br>D-F79F<br>D-F7BAL | D-F7NTL | D-A73/A80 | D-A72<br>D-A7□H/A80H<br>D-A73C/A80C<br>D-F7□/J79<br>D-J79C<br>D-F7□V | D-F7□W/J79W<br>D-F7□WV<br>D-F7LF (2)<br>D-F79F<br>D-F7BAL | D-F7NTL |
| **6** | 27.5 | 28 | 32 | 33 | 40.5 | 40 | 36 | 35 |
| **10** | 35 | 35.5 | 39.5 | 40.5 | 45 | 44.5 | 40.5 | 39.5 |
| **15** | 34.5 | 35 | 39 | 40 | 62.5 | 62 | 58 | 57 |
| **20** | 64 | 64.5 | 68.5 | 69.5 | 50 | 49.5 | 45.5 | 44.5 |
| **25** | 44 | 44.5 | 48.5 | 49.5 | 71 | 70.5 | 66.5 | 65.5 |
| **32** | 55 | 55.5 | 59.5 | 60.5 | 83 | 82.5 | 78.5 | 77.5 |
| **40** | 61 | 61.5 | 65.5 | 66.5 | 94 | 93.5 | 89.5 | 88.5 |

Note 1) 50mm is the minimum stroke available with 2 auto switches mounted. In case of a stroke less than this, contact SMC.
Note 2) Model D-F7LF cannot be mounted on bore sizes ø6 and ø10.

### Auto Switch Operating Range

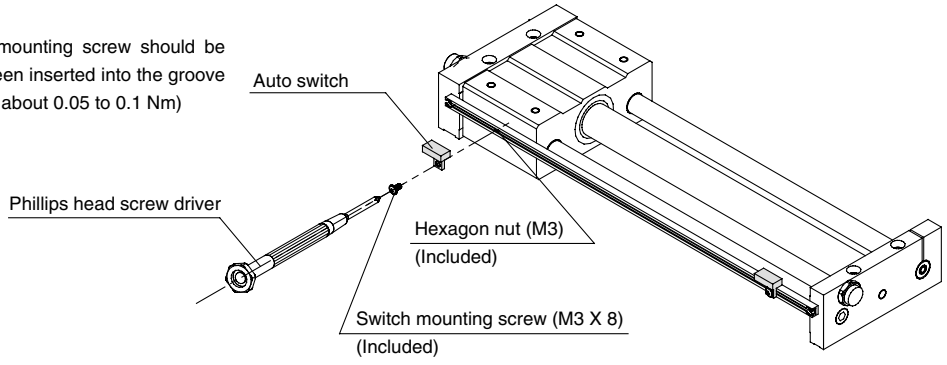
(mm)

| Auto switch model / Bore (mm) | D-A7□/A80<br>D-A7□H/A80H<br>D-A73C/A80C | D-F7□/J79<br>D-J79C<br>D-F7□V<br>D-F7NTL<br>D-F7□W/J79W<br>D-F7□WV<br>D-F7BAL | D-F7LF<br>D-F79F |
|---|---|---|---|
| **6** | 6 | 3 | 4.5 |
| **10** | 6 | 3 | 4.5 |
| **15** | 6 | 4 | 4.5 |
| **20** | 6 | 3 | 4.5 |
| **25** | 6 | 3 | 4.5 |
| **32** | 6 | 3 | 4.5 |
| **40** | 6 | 3.5 | 4.5 |

Note) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment. (variations on the order of ±30%)

## Auto Switch Mounting

When mounting an auto switch, the switch mounting screw should be screwed into a hexagon nut (M3) which has been inserted into the groove of the switch rail. (Tightening torque should be about 0.05 to 0.1 Nm)



# Magnetically Coupled Rodless Cylinder/ Slider Style: Ball Bushing Bearing

# Series CY1L

## How to Order

**Ball bushing bearing** □ **CY1L** **25** **H** — **300** □ — **A72** □

**Port size** (ø20 to ø40)

| | |
|---|---|
| — | Rc(PT) |
| **E** | G(PF) |

**Slider style (ball bushing bearing)**

**Bore size**

| | | | |
|---|---|---|---|
| **6** | 6mm | **25** | 25mm |
| **10** | 10mm | **32** | 32mm |
| **15** | 15mm | **40** | 40mm |
| **20** | 20mm | | |

**Magnetic holding force**

Refer to the magnet holding force table on p.3.28-39.

| | |
|---|---|
| **H** | 6 to 40 |
| **L** | 15 to 40 |

**Standard stroke**

Refer to the standard stroke table on p.3.28-39.

**Adjustment**

| | |
|---|---|
| **—** | With adjustment bolt |
| **B** | With shock absorber (2 pcs.) |
| **BS** | With shock absorber (with plate A)<br>∗ Installed on Side A at time of shipment. |

**Auto switch**

| | |
|---|---|
| **—** | Without auto switch |

∗ Refer to the table below for applicable auto switch types.

**Number of auto switches**

| | |
|---|---|
| **—** | 2 |
| **S** | 1 |
| **n** | n |

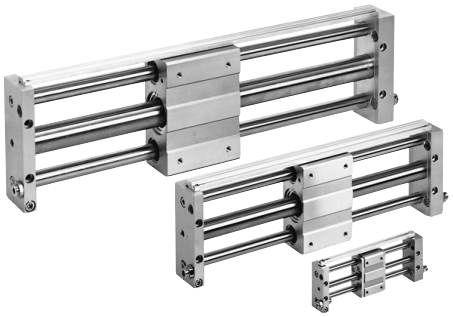
**Applicable Auto Switches/**Refer to p.5.3-2 for further information on auto switch.

| Style | Special function | Electrical entry | Indicator | Wiring (output) | Load voltage DC | Load voltage DC | Load voltage AC | Auto switch model Electrical entry Perp. | Auto switch model Electrical entry In-line | Lead wire (m) (1) 0.5 (—) | 3 (L) | 5 (Z) | None (N) | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3 wire (Equiv. NPN) | — | 5V | — | — | **A76H** | ● | ● | — | — | IC | — |
| | | | | 2 wire | — | — | 200V | **A72** | **A72H** | ● | ● | — | — | — | Relay PLC |
| | | | No | | 24V | 12V | 100V | **A73** | **A73H** | ● | ● | ● | — | | |
| | | | | | | 5V, 12V | 100V or less | **A80** | **A80H** | ● | ● | — | — | IC | |
| | | Connector | Yes | | | 12V | — | **A73C** | — | ● | ● | ● | ● | — | |
| | | | No | | | 5V, 12V | 24V or less | **A80C** | — | ● | ● | ● | ● | IC | |
| Solid state switch | — | Grommet | Yes | 3 wire (NPN) | 24V | 5V, 12V | — | **F7NV** | **F79** | ● | ● | ○ | — | IC | Relay PLC |
| | | | | 3 wire (PNP) | | | | **F7PV** | **F7P** | ● | ● | ○ | — | | |
| | | | | 2 wire | | 12V | | **F7BV** | **J79** | ● | ● | ○ | — | — | |
| | | Connector | | | | | | **J79C** | — | ● | ● | ● | ● | | |
| | Diagnostic indicator (2 colour) | Grommet | | 3 wire (NPN) | | 5V, 12V | | **F7NWV** | **F79W** | ● | ● | ○ | — | IC | |
| | | | | 3 wire (PNP) | | | | — | **F7PW** | ● | ● | ○ | — | | |
| | | | | 2 wire | | 12V | | **F7BWV** | **J79W** | ● | ● | ○ | — | — | |
| | Water resistant (2 colour) | | | | | | | — | **F7BA** | — | ● | ○ | — | | |
| | With timer | | | 3 wire (NPN) | | 5V, 12V | | — | **F7NT** | — | ● | ○ | — | IC | |
| | With diagnostic output (2 colour) | | | 4 wire (NPN) | | | | — | **F79F** | ● | ● | ○ | — | | |
| | Latch with diagnostic output (2 colour) | | | | | — | | — | **F7LF** (3) | ● | ● | ○ | — | — | |

Note 1) Lead wire length 0.5m ·····— (Example) A80C
3m·····L (Example) A80CL
5m·····Z (Example) A80CZ
None·····N (Example) A80CN

Note 2) Solid state switches marked with a "○" are manufactured upon receipt of order.

Note 3) Type D-F7LF cannot be mounted on bore sizes ø6 and ø10.



## Long life design

Ball bushings having excellent trafficability are used in the guides.
Ball bushing bearing: With grease cup

## Easy piping and wiring

Hollow shafts are used, and centralization of ports on one side makes piping easy.
Auto switches can be mounted through the use of special switch rails.

## Shock absorbers and adjustment bolt are standard equipment

Impacts at stroke end due to high speed use can be absorbed, and fine adjustment of the stroke is possible.

## Models

| Style | Bearing style | Model | Bore size (mm) | With auto switch | Adjustment style |
|---|---|---|---|---|---|
| Slider style | Ball bushing | **CY1L** | 6, 10, 15, 20, 25, 32, 40 | D-A7/A8 D-F7/J7 | Adjustment bolt Shock absorber |

## Specifications

| | |
|---|---|
| **Fluid** | Air |
| **Proof pressure** | 1.05MPa |
| **Maximum operating pressure** | 0.7MPa |
| **Minimum operating pressure** | 0.18MPa |
| **Ambient and fluid temperature** | -10 to 60°C |
| **Piston speed (1)** | 50 to 500mm/s |
| **Cushion** | Shock absorber/Rubber bumper |
| **Lubrication** | Non-lube |
| **Stroke length tolerance** | 0 to 250st: $^{+1.0}_{0}$, 251 to 1000st: $^{+1.4}_{0}$, 1001st to: $^{+1.8}_{0}$ |
| **Mounting orientation** | Unrestricted |
| **Standard equipment** | Auto switch mounting rail |

Note 1) In the case where an auto switch is mounted at an intermediate position, the maximum detectable piston speed is controlled by the response time of the load (relays, sequencecontroller, etc.).

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) | Maximum available stroke (mm) |
|---|---|---|
| **6** | 50, 100, 150, 200 | 300 |
| **10** | 50, 100, 150, 200, 250, 300 | 500 |
| **15** | 50, 100, 150, 200, 250, 300, 350 400, 450, 500 | 750 |
| **20** | 100, 150, 200, 250, 300, 350 400, 450, 500, 600, 700, 800 | 1000 |
| **25** | | 1500 |
| **32** | | |
| **40** | 100, 150, 200, 250, 300, 350 400, 450, 500, 600, 700, 800 900, 1000 | 1500 |

## Magnetic Holding Force (N)

| Bore size (mm) | | **6** | **10** | **15** | **20** | **25** | **32** | **40** |
|---|---|---|---|---|---|---|---|---|
| Holding force style | **H type** | 19.6 | 53.9 | 137 | 231 | 363 | 588 | 922 |
| | **L type** | — | — | 81.4 | 154 | 221 | 358 | 569 |

## Weight

(kg)

| No. of magnets \ Bore size (mm) | | **6** | **10** | **15** | **20** | **25** | **32** | **40** |
|---|---|---|---|---|---|---|---|---|
| Basic weight | **CY1L□H** | 0.324 | 0.580 | 1.10 | 1.85 | 2.21 | 4.36 | 4.83 |
| | **CY1L□L** | — | — | 1.02 | 1.66 | 2.04 | 4.18 | 4.61 |
| Additional weight per 50mm of stroke | | 0.044 | 0.077 | 0.104 | 0.138 | 0.172 | 0.267 | 0.406 |

Calculation example: CY1L32H-500
Basic weight·····4.36kg Additional weight·····0.267/50st Cylinder stroke·····500st
4.36 + 0.267 X 500 50 = 7.03kg

## Stroke Adjustment with Adjustment Bolt

| Bore size (mm) | Adjustment bolt (both sides) (mm) |
|---|---|
| **6** | 12 |
| **10** | 11 |
| **15** | 7 |
| **20** | 11 |
| **25** | 10 |
| **32** | 11 |
| **40** | 9 |

∗ Since the cylinder is in an intermediate stop condition when stroke adjustment is performed, use caution regarding the operating pressure and the kinetic energy of the load.

## Principal Materials

| Description | Material | Note |
|---|---|---|
| Cylinder tube | Stainless steel | — |
| Magnet | Rare earth magnet | — |
| Slide block | Aluminum alloy | Hard anodized |

# ⚠ Precautions

**Be sure to read before handling. Refer to p.0-39 to 0-43 for Safety Instructions and actuator precautions.**

## Operation

### ⚠Warning

① **Use caution in the space between the plates and the slide block.**
Take sufficient care as fingers and hands, etc. may be injured if caught while the cylinder is in operation.

② **Do not apply a load to a cylinder which is greater than the allowable value in the selection data.**

## Mounting

### ⚠Caution

① **Avoid operation with the external slider fixed to a mounting surface.**
The cylinder should be operated with the plates fixed to a mounting surface.

② **Perform mounting so that the external slider will operate through the entire stroke at the minimum operating pressure.**
If the mounting surface is not flat, the guides will be warped, increasing the minimum operating pressure and causing premature wear of the bearings. Therefore, mounting should be performed so that the external slider will operate through the entire stroke at the minimum operating pressure. A mounting surface with a high degree of flatness is desired, but in cases where this cannot be adequately confirmed, shim adjustment, etc. should be performed.

## Disassembly & Maintenance

### ⚠Warning

① **Use caution as the power of the magnets is very strong.**
When removing the external slider and piston slider from the cylinder tube for maintenance, etc., handle with caution, since the magnets installed in each slider have very strong attractive power.

### ⚠Caution

① **Use caution when taking off the external slider, as the piston slider will be directly attracted to it.**
When removing the external slider or piston slider from the cylinder tube, first force the sliders out of their magnetically coupled positions and then remove them individually when there is no longer any holding force. If they are removed when still magnetically coupled, they will be directly attracted to one another and will not come apart.

② **Since the magnetic holding force can be changed (for example, from CY1S25L to CY1S25H), contact SMC if this is necessary.**

③ **Do not disassemble the magnetic components (piston slider, external slider).**
This can cause a loss of holding force and malfunction.

④ **When disassembling to replace the seals and wear ring, refer to the separate disassemble instructions.**

⑤ **Note the direction of the external slider and piston slider.**
Since the external slider and piston slider are directional for ø6, ø10 and holding force type L, refer to the drawings below when performing disassembly or maintenance. Put the external slider and piston slider together, and insert the piston slider into the cylinder tube so that they will have the correct positional relationship as shown in Figure 1. If they align as shown in Figure 2, insert the piston slider after turning it around 180°. If the direction is not correct, it will be impossible to obtain the specified holding force.

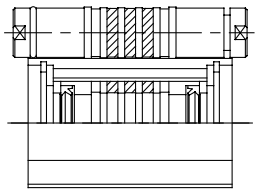


Figure 1. Correct position

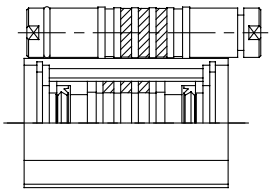


Figure 2. Incorrect position

Example for ø15 with holding force type L

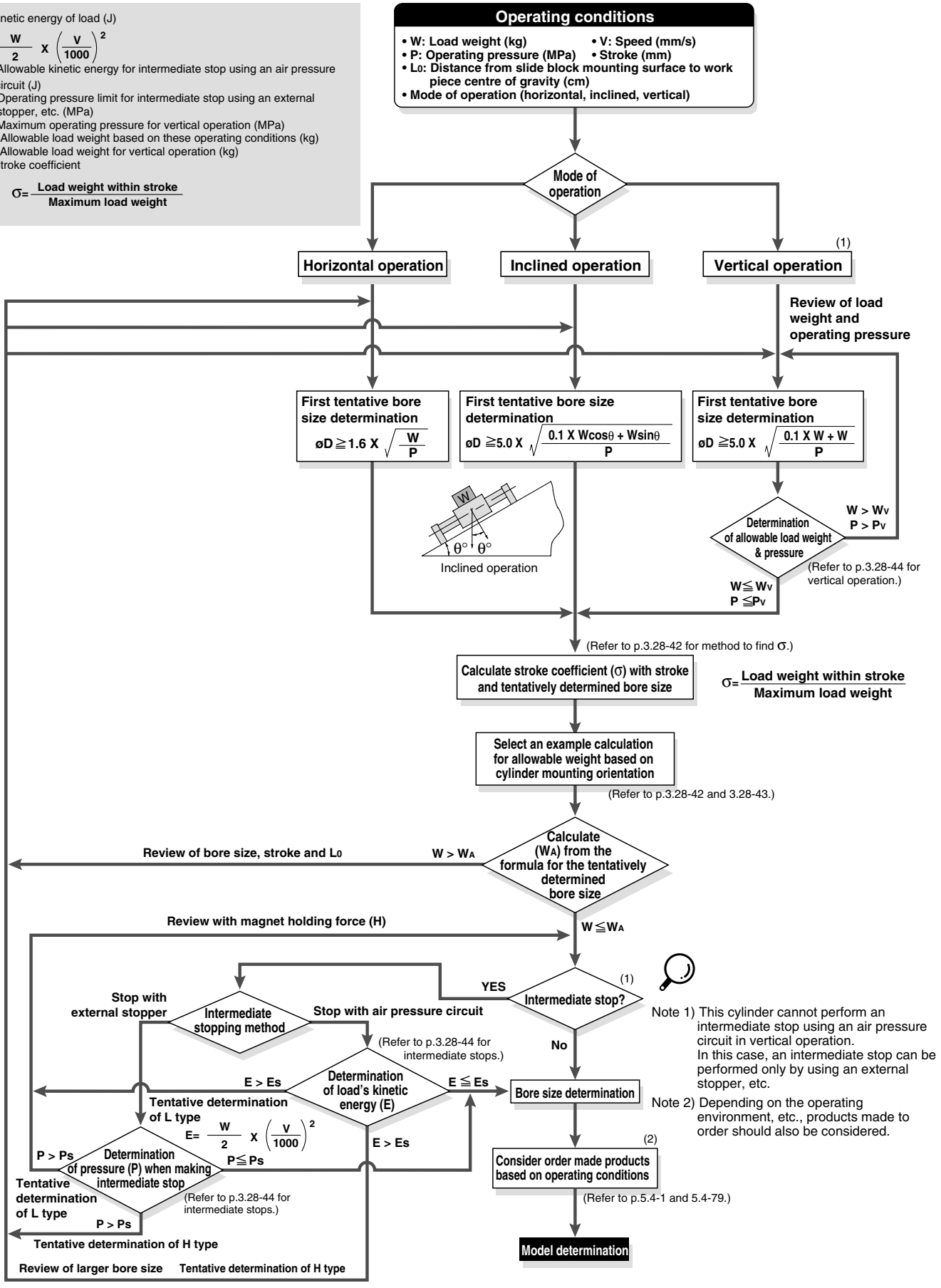
# How to Select ①

**E:** Kinetic energy of load (J)

$$E = \frac{W}{2} \times \left(\frac{V}{1000}\right)^2$$

**Es:** Allowable kinetic energy for intermediate stop using an air pressure circuit (J)
**Ps:** Operating pressure limit for intermediate stop using an external stopper, etc. (MPa)
**Pv:** Maximum operating pressure for vertical operation (MPa)
**WA:** Allowable load weight based on these operating conditions (kg)
**Wv:** Allowable load weight for vertical operation (kg)
**σ:** Stroke coefficient

$$\sigma = \frac{\text{Load weight within stroke}}{\text{Maximum load weight}}$$




Note 1) This cylinder cannot perform an intermediate stop using an air pressure circuit in vertical operation.
In this case, an intermediate stop can be performed only by using an external stopper, etc.

Note 2) Depending on the operating environment, etc., products made to order should also be considered.

# Series CY1L
# How to Select ②

**Precautions on Design ①**

## How to Find σ when Selecting the Allowable Load Weight

Since the maximum load weight with respect to the cylinder stroke changes as shown in the table below, σ should be considered as a coefficient determined in accordance with to each stroke.
Example CY1L25 □–650

(1) Maximum load weight = 20kg

(2) Load weight for 650st = 13.6kg

(3) $\sigma = \frac{13.6}{20}$ = 0.68 is the result.

### Calculation formula for σ (σ ≦1)

ST: Stroke (mm)

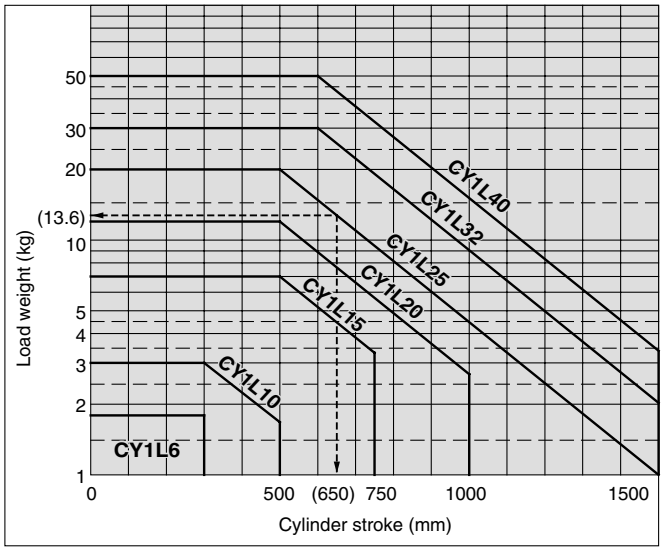
| Model | CY1L6 | CY1L10 |
|---|---|---|
| σ= | 1 | $\frac{10^{(0.86 - 1.3 \times 10^{-3} \times ST)}}{3}$ |

| Model | CY1L15 | CY1L20 |
|---|---|---|
| σ= | $\frac{10^{(1.5 - 1.3 \times 10^{-3} \times ST)}}{7}$ | $\frac{10^{(1.71 - 1.3 \times 10^{-3} \times ST)}}{12}$ |

| Model | CY1L25 | CY1L32 |
|---|---|---|
| σ= | $\frac{10^{(1.98 - 1.3 \times 10^{-3} \times ST)}}{20}$ | $\frac{10^{(2.26 - 1.3 \times 10^{-3} \times ST)}}{30}$ |

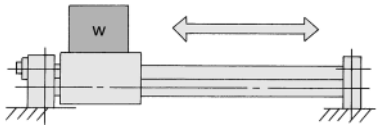
| Model | CY1L40 |
|---|---|
| σ= | $\frac{10^{(2.48 - 1.3 \times 10^{-3} \times ST)}}{50}$ |

Note) Calculate with σ=1 for all applications up to ø10–300mmST, ø15–500mmST, ø20–500mmST, ø25–500mmST, ø32–600mmST and ø40–600mmST.




## Examples of Allowable Load Weight Calculation Based on Cylinder Mounting Orientation

### 1. Horizontal operation (floor mounting)

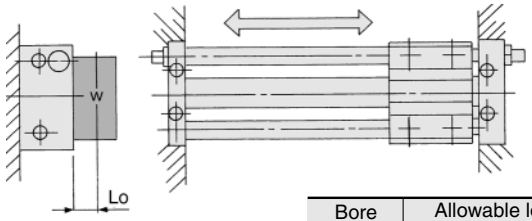



Maximum load weight (center of slide blow) (kg)

| Bore size (mm) | 6 | 10 | 15 | 20 | 25 | 32 | 40 |
|---|---|---|---|---|---|---|---|
| Max. load weight (kg) | 1.8 | 3 | 7 | 12 | 20 | 30 | 50 |
| Stroke (max) | 300st | 300st | 500st | 500st | 500st | 600st | 600st |

The above maximum load weight values will change with the stroke length for each cylinder size, due to limitation from warping of the guide shafts. (Note the coefficient σ.)
Moreover, depending on the operating direction, the allowable load weight may be different from the maximum load weight.

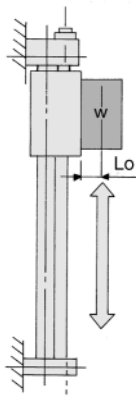
### 2. Horizontal operation (wall mounting)




Lo: Distance from mounting surface to load centre of gravity (cm)

| Bore (mm) | Allowable load weight ($W_A$)(kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 6.48}{6.8 + 2Lo}$ |
| 10 | $\frac{\sigma \cdot 15.0}{8.9 + 2Lo}$ |
| 15 | $\frac{\sigma \cdot 45.5}{11.3 + 2Lo}$ |
| 20 | $\frac{\sigma \cdot 101}{13.6 + 2Lo}$ |
| 25 | $\frac{\sigma \cdot 180}{15.2 + 2Lo}$ |
| 32 | $\frac{\sigma \cdot 330}{18.9 + 2Lo}$ |
| 40 | $\frac{\sigma \cdot 624}{22.5 + 2Lo}$ |

### 3. Vertical operation




| Bore (mm) | Allowable load weight ($W_A$)(kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 1.53}{1.6 + Lo}$ |
| 10 | $\frac{\sigma \cdot 5.00}{1.95 + Lo}$ |
| 15 | $\frac{\sigma \cdot 15.96}{2.4 + Lo}$ |
| 20 | $\frac{\sigma \cdot 31.1}{2.8 + Lo}$ |
| 25 | $\frac{\sigma \cdot 54.48}{3.1 + Lo}$ |
| 32 | $\frac{\sigma \cdot 112.57}{3.95 + Lo}$ |
| 40 | $\frac{\sigma \cdot 212.09}{4.75 + Lo}$ |

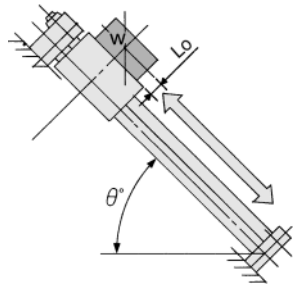
Lo: Distance from mounting surface to load centre of gravity (cm)
Note) A safety factor should be considered to prevent dropping.

# How to Select ③

**Precautions on Design ②**

## Examples of Allowable Load Weight Calculation Based on Cylinder Mounting Orientation

### 4. Inclined operation (in direction of operation)



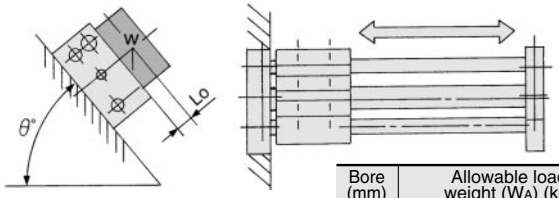

| Angle | to 45° | to 60° | to 75° | to 90° |
|---|---|---|---|---|
| k | 1 | 0.9 | 0.8 | 0.7 |

| Bore (mm) | Allowable load weight ($W_A$) (kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 4.05 \cdot K}{1.7\cos\theta + 2(1.6 + Lo)\sin\theta}$ |
| 10 | $\frac{\sigma \cdot 10.2 \cdot K}{2.8\cos\theta + 2(1.95 + Lo)\sin\theta}$ |
| 15 | $\frac{\sigma \cdot 31.1 \cdot K}{2.9\cos\theta + 2(2.4 + Lo)\sin\theta}$ |
| 20 | $\frac{\sigma \cdot 86.4 \cdot K}{6\cos\theta + 2(2.8 + Lo)\sin\theta}$ |
| 25 | $\frac{\sigma \cdot 105.4 \cdot K}{3.55\cos\theta + 2(3.1 + Lo)\sin\theta}$ |
| 32 | $\frac{\sigma \cdot 178 \cdot K}{4\cos\theta + 2(3.95 + Lo)\sin\theta}$ |
| 40 | $\frac{\sigma \cdot 361.9 \cdot K}{5.7\cos\theta + 2(4.75 + Lo)\sin\theta}$ |

Angle coefficient (k)k= [to 45°(= θ)] = 1,
[to 60°] = 0.9, [to 75°] = 0.8,
[to 90°] = 0.7

Lo: Distance from mounting surface to load centre of gravity (cm)

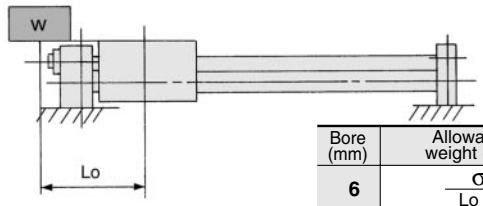
### 5. Inclined operation (at right angle to direction of operation)




Lo: Distance from slide block centre to load centre of gravity (cm)

| Bore (mm) | Allowable load weight ($W_A$) (kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 6.48}{3.6 + 2(1.6 + Lo)\sin\theta}$ |
| 10 | $\frac{\sigma \cdot 15}{5 + 2(1.95 + Lo)\sin\theta}$ |
| 15 | $\frac{\sigma \cdot 45.5}{6.5 + 2(2.4 + Lo)\sin\theta}$ |
| 20 | $\frac{\sigma \cdot 115}{8 + 2(2.8 + Lo)\sin\theta}$ |
| 25 | $\frac{\sigma \cdot 180}{9 + 2(3.1 + Lo)\sin\theta}$ |
| 32 | $\frac{\sigma \cdot 330}{11 + 2(3.95 + Lo)\sin\theta}$ |
| 40 | $\frac{\sigma \cdot 624}{13 + 2(4.75 + Lo)\sin\theta}$ |

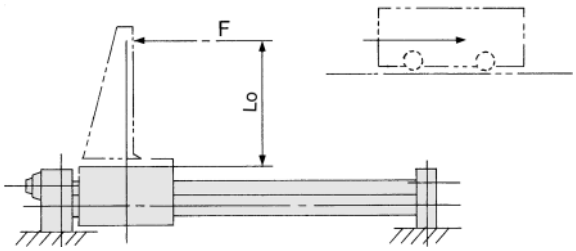
### 6. Load centre offset in operating direction (Lo)




Lo: Distance from slide block centre to load centre of gravity (cm)

| Bore (mm) | Allowable load weight ($W_A$) (kg) |
|---|---|
| 6 | $\frac{\sigma \cdot 2}{Lo + 1.7}$ |
| 10 | $\frac{\sigma \cdot 5.6}{Lo + 2.8}$ |
| 15 | $\frac{\sigma \cdot 13.34}{Lo + 2.9}$ |
| 20 | $\frac{\sigma \cdot 43.2}{Lo + 6}$ |
| 25 | $\frac{\sigma \cdot 46.15}{Lo + 3.55}$ |
| 32 | $\frac{\sigma \cdot 80}{Lo + 4}$ |
| 40 | $\frac{\sigma \cdot 188.1}{Lo + 5.7}$ |

### 7. Horizontal operation (pushing load, pusher)

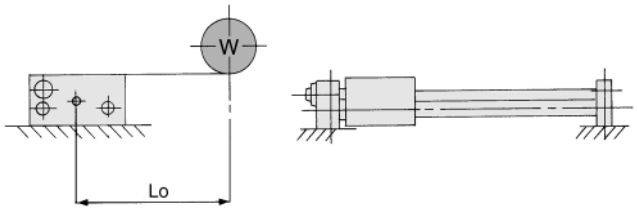



F: Drive (from slide block to position Lo) resistance force (kg)
Lo: Distance from mounting surface to load centre of gravity (cm)

| Bore (mm) | 6 | 10 | 15 | 20 |
|---|---|---|---|---|
| Allowable load weight ($W_A$) (kg) | $\frac{\sigma \cdot 2.72}{1.6 + Lo}$ | $\frac{\sigma \cdot 5.55}{1.95 + Lo}$ | $\frac{\sigma \cdot 15.96}{2.4 + Lo}$ | $\frac{\sigma \cdot 41.7}{2.8 + Lo}$ |

| Bore (mm) | 25 | 32 | 40 |
|---|---|---|---|
| Allowable load weight ($W_A$) (kg) | $\frac{\sigma \cdot 58.9}{3.1 + Lo}$ | $\frac{\sigma \cdot 106.65}{3.95 + Lo}$ | $\frac{\sigma \cdot 228}{4.75 + Lo}$ |

### 8. Horizontal operation (load, in-line offset Lo)




Lo: Distance from centre of slide block to load centre of gravity (cm)

| Bore (mm) | 6 | 10 | 15 | 20 |
|---|---|---|---|---|
| Allowable load weight ($W_A$) (kg) | $\frac{\sigma \cdot 6.48}{3.6 + Lo}$ | $\frac{\sigma \cdot 15}{5 + Lo}$ | $\frac{\sigma \cdot 45.5}{6.5 + Lo}$ | $\frac{\sigma \cdot 80.7}{8 + Lo}$ |

| Bore (mm) | 25 | 32 | 40 |
|---|---|---|---|
| Allowable load weight ($W_A$) (kg) | $\frac{\sigma \cdot 144}{9 + Lo}$ | $\frac{\sigma \cdot 275}{11 + Lo}$ | $\frac{\sigma \cdot 520}{13 + Lo}$ |

# How to Select ④

**Precautions on Design ③**

## Vertical Operation

When operating a load vertically, it should be operated within the allowable load weight and maximum operating pressure shown in the table below.
Use caution, as operating above the prescribed values may lead to dropping of the load.

| Bore (mm) | Model | Allowable load weight (Wv) (kg) | Max. operating pressure (Pv) (MPa) |
|---|---|---|---|
| 6 | CY1L 6H | 1.0 | 0.55 |
| 10 | CY1L10H | 2.7 | 0.55 |
| 15 | CY1L15H | 7.0 | 0.65 |
| | CY1L15L | 4.1 | 0.40 |
| 20 | CY1L20H | 11.0 | 0.65 |
| | CY1L20L | 7.0 | 0.40 |
| 25 | CY1L25H | 18.5 | 0.65 |
| | CY1L25L | 11.2 | 0.40 |
| 32 | CY1L32H | 30.0 | 0.65 |
| | CY1L32L | 18.2 | 0.40 |
| 40 | CY1L40H | 47.0 | 0.65 |
| | CY1L40L | 29.0 | 0.40 |

Note) Use caution, as there is a possibility of breaking the magnetic coupling if operated above the maximum operating pressure.

## Intermediate Stops

**1) Intermediate stops of load with an external stopper, etc.**
When stopping a load in mid-stroke using an external stopper (adjustment bolt, etc.), operate within the operating pressure limits shown in the table below. Use caution, as operation at a pressure exceeding these limits can break the magnetic coupling.

| Bore (mm) | Model | Operating pressure limit for intermediate stops (Ps) (MPa) |
|---|---|---|
| 6 | CY1L 6H | 0.55 |
| 10 | CY1L10H | 0.55 |
| 15 | CY1L15H | 0.65 |
| | CY1L15L | 0.40 |
| 20 | CY1L20H | 0.65 |
| | CY1L20L | 0.40 |
| 25 | CY1L25H | 0.65 |
| | CY1L25L | 0.40 |
| 32 | CY1L32H | 0.65 |
| | CY1L32L | 0.40 |
| 40 | CY1L40H | 0.65 |
| | CY1L40L | 0.40 |

**2) Intermediate stops of load with an air pressure circuit**
When stopping a load using an air pressure circuit, operate at or below the kinetic energy shown in the table below. Use caution, as operation when exceeding the allowable value can break the magnetic coupling.

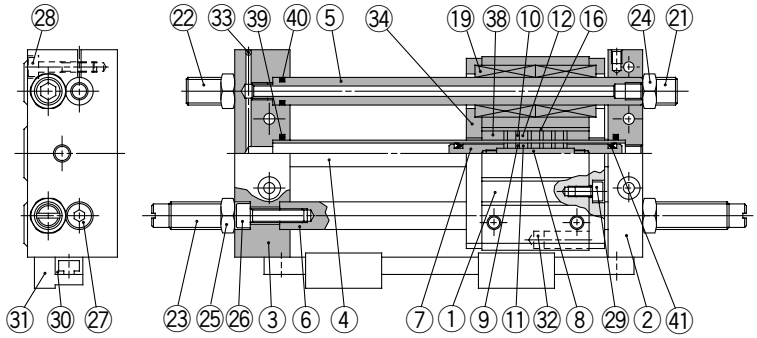
(Reference values)

| Bore (mm) | Model | Allowable kinetic energy for intermediate stops (Es) (J) |
|---|---|---|
| 6 | CY1L 6H | 0.007 |
| 10 | CY1L10H | 0.03 |
| 15 | CY1L15H | 0.13 |
| | CY1L15L | 0.076 |
| 20 | CY1L20H | 0.24 |
| | CY1L20L | 0.16 |
| 25 | CY1L25H | 0.45 |
| | CY1L25L | 0.27 |
| 32 | CY1L32H | 0.88 |
| | CY1L32L | 0.53 |
| 40 | CY1L40H | 1.53 |
| | CY1L40L | 0.95 |

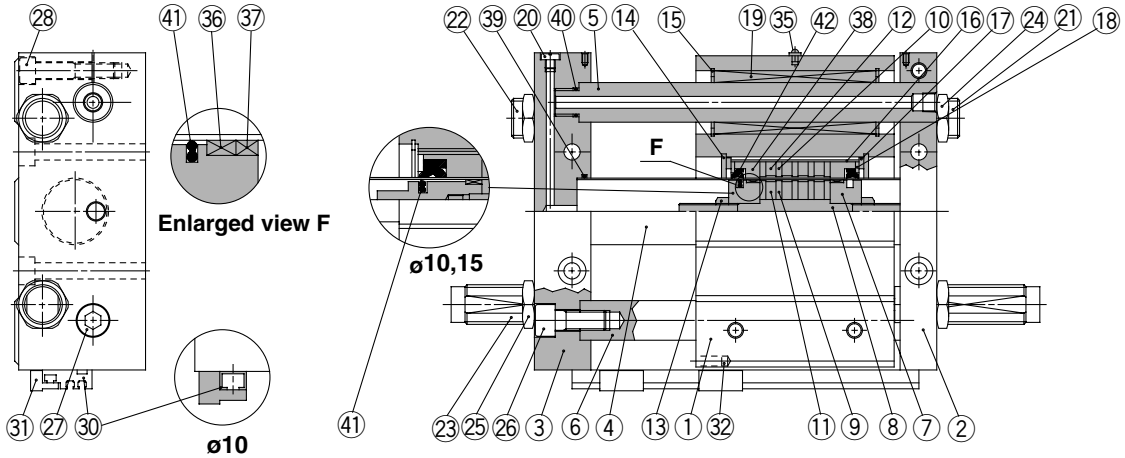
## Construction

### Slider style/Ball bushing bearing

**CY1L6**




**CY1L10 to 40**




**Component Parts**

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Slide block | Aluminum alloy | Hard anodized |
| ② | Plate A | Aluminum alloy | Hard anodized |
| ③ | Plate B | Aluminum alloy | Hard anodized |
| ④ | Cylinder tube | Stainless steel | |
| ⑤ | Guide shaft A | Carbon steel | Hard chrome plated |
| ⑥ | Guide shaft B | Carbon steel | Hard chrome plated |
| ⑦ | Piston | Aluminum alloy (1) | Chromated |
| ⑧ | Shaft | Stainless steel | |
| ⑨ | Piston side yoke | Rolled steel plate | Zinc chromated |
| ⑩ | External slider side yoke | Rolled steel plate | Zinc chromated |
| ⑪ | Magnet A | Rare earth magnet | |
| ⑫ | Magnet B | Rare earth magnet | |
| ⑬ | Piston nut | Carbon steel | Zinc chromated ø25 to ø40 |
| ⑭ | Snap ring | Carbon tool steel | Nickel plated |
| ⑮ | Snap ring | Carbon tool steel | Nickel plated |
| ⑯ | External slider tube | Aluminum alloy | |
| ⑰ | Slider spacer | Rolled steel plate | Nickel plated |
| ⑱ | Spacer | Rolled steel plate | Nickel plated |
| ⑲ | Ball bushing | — | |
| ⑳ | Plug | Brass | ø25, ø32, ø40 only |
| ㉑ | Adjustment bolt A | Chrome molybdenum steel | Nickel plated |
| ㉒ | Adjustment bolt B | Chrome molybdenum steel | Nickel plated |
| ㉓ | Shock absorber | — | |
| ㉔ | Hexagon nut | Carbon steel | Nickel plated |
| ㉕ | Hexagon nut | Carbon steel | Nickel plated |
| ㉖ | Hex socket head screw | Chrome molybdenum steel | Nickel plated |
| ㉗ | Hex socket head screw | Chrome molybdenum steel | Nickel plated |
| ㉘ | Hex socket head screw | Chrome molybdenum steel | Nickel plated |

Note 1) Brass for ø6, ø10, ø15

| No. | Description | Material | Note |
|---|---|---|---|
| ㉙ | Hexagon socket head screw | Chrome molybdenum steel | Nickel plated |
| ㉚ | Switch mounting rail | Aluminum alloy | |
| ㉛ | Auto switch | – | |
| ㉜ | Magnet for auto switch | Rare earth magnet | |
| ㉝ | Steel ball | – | ø6, ø10, ø15 only |
| ㉞ | Side cover | Carbon steel | ø6 only |
| ㉟ | Grease cup | Carbon steel | ø15 or larger |
| ㊱* | Wear ring A | Special resin | |
| ㊲* | Wear ring | Special resin | |
| ㊳* | Wear ring B | Special resin | |
| ㊴* | Cylinder tube gasket | NBR | |
| ㊵* | Guide shaft gasket | NBR | |
| ㊶* | Piston seal | NBR | |
| ㊷* | Scraper | NBR | |

**Replacement Parts: Seal Kits**

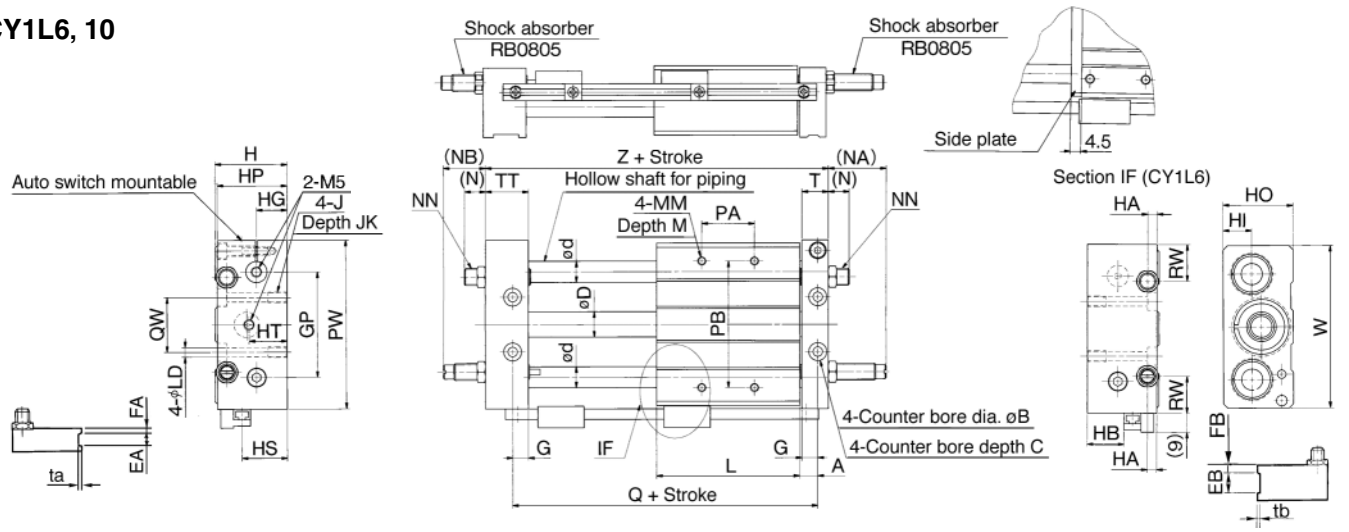
| Bore size (mm) | Kit No. | Content |
|---|---|---|
| **6** | CY1L6-PS-N | Nos. ㊳, ㊴, ㊵, ㊶ above |
| **10** | CY1L10-PS-N | Nos. ㊱, ㊳, ㊴, ㊵, ㊶, ㊷ above |
| **15** | CY1L15-PS-N | |
| **20** | CY1L20-PS-N | Nos. ㊱, ㊲, ㊳, ㊴, ㊵, ㊶, ㊷ above |
| **25** | CY1L25-PS-N | |
| **32** | CY1L32-PS-N | |
| **40** | CY1L40-PS-N | |

* Seal kits are sets consisting of items ㊱ through ㊷, and can be ordered using the order number for each bore size.

## Dimensions

### Slider style/Ball bushing bearing

**CY1L6, 10**



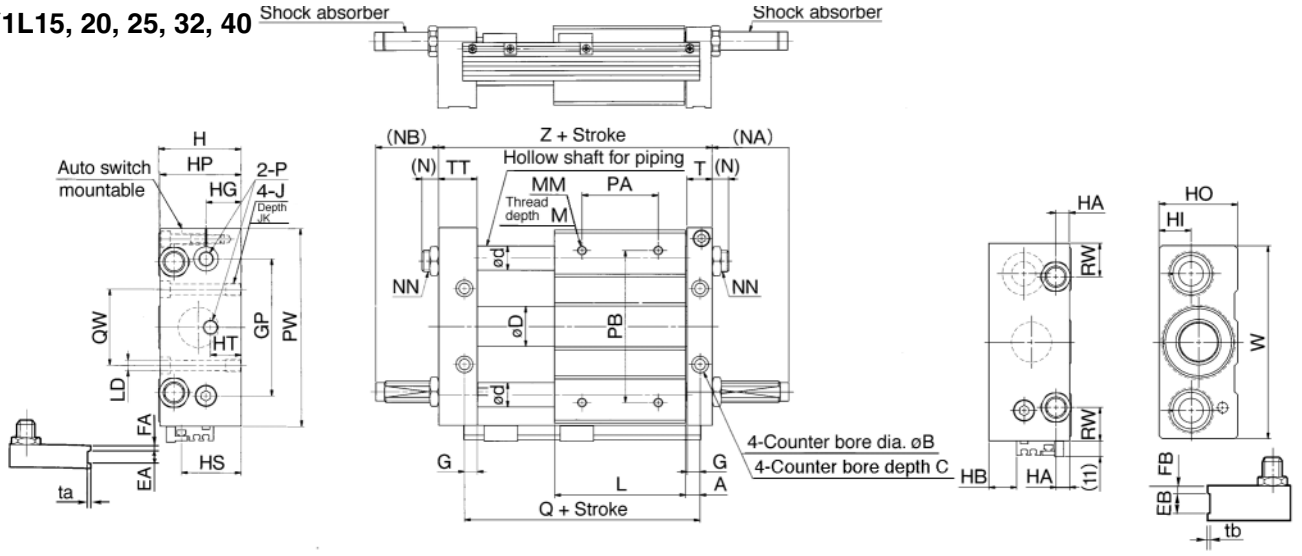

(mm)

| Model | A | B | C | D | d | EA | EB | FA | FB | G | GP | H | HA | HB | HG | HI | HO | HP | HS | HT | J | JK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1L6** | 7 | 6.5 | 3 | 7.6 | 8 | — | — | — | — | 6 | 36 | 27 | 6 | 10 | 11 | 9 | 25 | 26 | 14 | 16 | M4 | 6.5 |
| **CY1L10** | 8.5 | 8 | 4 | 12 | 10 | 6 | 12 | 3 | 5 | 7.5 | 50 | 34 | 6 | 17.5 | 14.5 | 13.5 | 33 | 33 | 21.5 | 18 | M5 | 9.5 |

| Model | L | LD | M | MM | (N) | (NA) | (NB) | NN | PA* | PB | PW | Q | QW | RW | T | TT | ta | tb | W | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1L6** | 40 | 3.5 | 6 | M4 | 10 | 30 | 24 | M8 X 1.0 | 24 | 40 | 60 | 54 | 20 | 12 | 10 | 16 | — | — | 56 | 68 |
| **CY1L10** | 68 | 4.3 | 8 | M4 | 9.5 | 27 | 19 | M8 X 1.0 | 30 | 60 | 80 | 85 | 26 | 17.5 | 12.5 | 20.5 | 0.5 | 1.0 | 77 | 103 |

∗ PA dimensions are for split from center.

**CY1L15, 20, 25, 32, 40**




(mm)

| Model | A | B | C | D | d | EA | EB | FA | FB | G | GP | H | HA | HB | HG | HI | HO | HP | HS | HT | J | JK | L | LD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1L15** | 7.5 | 9.5 | 5 | 16.6 | 12 | 6 | 13 | 3 | 6 | 6.5 | 65 | 40 | 6.5 | 4 | 16 | 14 | 38 | 39 | 25 | 16 | M6 | 9.5 | 75 | 5.6 |
| **CY1L20** | 9.5 | 9.5 | 5.2 | 21.6 | 16 | — | — | — | — | 8.5 | 80 | 46 | 9 | 10 | 18 | 16 | 44 | 45 | 31 | 20 | M6 | 10 | 86 | 5.6 |
| **CY1L25** | 9.5 | 11 | 6.5 | 26.4 | 16 | 8 | 14 | 4 | 7 | 8.5 | 90 | 54 | 9 | 18 | 23 | 21 | 52 | 53 | 39 | 20 | M8 | 10 | 86 | 7 |
| **CY1L32** | 10.5 | 14 | 8 | 33.6 | 20 | 8 | 16 | 5 | 7 | 9.5 | 110 | 66 | 12 | 26.5 | 26.5 | 24.5 | 64 | 64 | 47.5 | 25 | M10 | 15 | 100 | 9.2 |
| **CY1L40** | 11.5 | 14 | 8 | 41.6 | 25 | 10 | 20 | 5 | 10 | 10.5 | 130 | 78 | 12 | 35 | 30.5 | 28.5 | 76 | 74 | 56 | 30 | M10 | 15 | 136 | 9.2 |

| Model | M | MM | (N) | (NA) | (NB) | NN | P | PA* | PB | PW | Q | QW | RW | T | ta | tb | TT | W | Z | Shock absorber |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1L15** | 8 | M5 | 7.5 | 27 | 17 | M8 X 1.0 | M5 | 45 | 70 | 95 | 90 | 30 | 15 | 12.5 | 0.5 | 1.0 | 22.5 | 92 | 112 | RB0805 |
| **CY1L20** | 10 | M6 | 10 | 29 | 20 | M10 X 1.0 | 1/8 | 50 | 90 | 120 | 105 | 40 | 28 | 16.5 | — | — | 25.5 | 117 | 130 | RB1006 |
| **CY1L25** | 10 | M6 | 11 | 49 | 40 | M14 X 1.5 | 1/8 | 60 | 100 | 130 | 105 | 50 | 22 | 16.5 | 0.5 | 1.0 | 25.5 | 127 | 130 | RB1411 |
| **CY1L32** | 12 | M8 | 11.5 | 52 | 42 | M20 X 1.5 | 1/8 | 70 | 120 | 160 | 121 | 60 | 33 | 18.5 | 0.5 | 1.0 | 28.5 | 157 | 149 | RB2015 |
| **CY1L40** | 12 | M8 | 10.5 | 51 | 36 | M20 X 1.5 | 1/4 | 90 | 140 | 190 | 159 | 84 | 35 | 20.5 | 1.0 | 1.0 | 35.5 | 187 | 194 | |

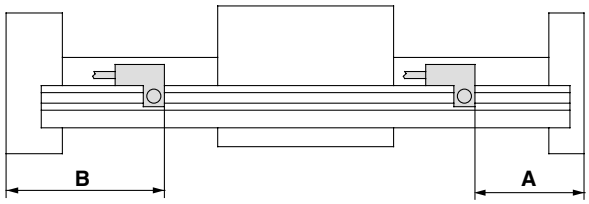
∗ PA dimensions are for split from center.

# Shock Absorber Specifications/Series RB

| Applicable rodless cylinder | | CY1L 6 10 15 | CY1L20 | CY1L25 | CY1L 32 40 |
|---|---|---|---|---|---|
| Shock absorber model | | RB0805 | RB1006 | RB1411 | RB2015 |
| Maximum energy absorption (J) | | 0.98 | 3.92 | 14.7 | 58.8 |
| Stroke absorption (mm) | | 5 | 6 | 11 | 15 |
| Impact speed (m/s) | | 0.05 to 5 | | | |
| Max. operating frequency (cycle/min) (1) | | 80 | 70 | 45 | 25 |
| Ambient temperature range | | –10 to 80°C | | | |
| Spring force (N) | Extended | 1.96 | 4.22 | 6.86 | 8.34 |
| | Compressed | 3.83 | 6.18 | 15.3 | 20.50 |

Note 1) Indicates time of maximum energy absorption per cycle. Therefore, the operating frequency can be increased according to the energy absorption.

## Auto Switch Proper Mounting Position for Stroke End Detection




(mm)

| Auto switch model / Bore (mm) | Dimension A | | | | Dimension B | | | |
|---|---|---|---|---|---|---|---|---|
| | D-A73/A80 | D-A72<br>D-A7□H/A80H<br>D-A73C/A80C<br>D-F7□/J79<br>D-J79C<br>D-F7□V | D-F7□W/J79W<br>D-F7□WV<br>D-F7LF (2)<br>D-F79F<br>D-F7BAL | D-F7NTL | D-A73/A80 | D-A72<br>D-A7□H/A80H<br>D-A73C/A80C<br>D-F7□/J79<br>D-J79C<br>D-F7□V | D-F7□W/J79W<br>D-F7□WV<br>D-F7LF (2)<br>D-F79F<br>D-F7BAL | D-F7NTL |
| **6** | 23 | 23.5 | 27.5 | 28.5 | 45 | 44.5 | 40.5 | 39.5 |
| **10** | 58 | 58.5 | 62.5 | 63.5 | 45 | 44.5 | 40.5 | 39.5 |
| **15** | 65 | 65.5 | 69.5 | 70.5 | 47 | 46.5 | 42.5 | 41.5 |
| **20** | 76 | 76.5 | 80.5 | 81.5 | 54 | 53.5 | 49.5 | 48.5 |
| **25** | 76 | 76.5 | 80.5 | 81.5 | 54 | 53.5 | 49.5 | 48.5 |
| **32** | 92 | 92.5 | 96.5 | 97.5 | 57 | 56.5 | 52.5 | 51.5 |
| **40** | 130 | 130.5 | 134.5 | 135.5 | 64 | 63.5 | 59.5 | 58.5 |

Note 1) 50mm is the minimum stroke available with 2 auto switches mounted. In case of a stroke less than this, contact SMC.
Note 2) Model D-F7LF cannot be mounted on bore sizes ø6 and ø10.

### Auto Switch Operating Range

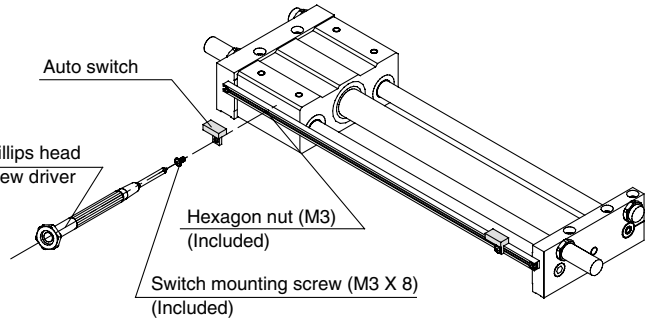
(mm)

| Auto switch model / Bore (mm) | D-A7□/A80<br>D-A7□H/A80H<br>D-A73C/A80C | D-F7□/J79<br>D-J79C<br>D-F7□V<br>D-F7NTL<br>D-F7□W/J79W<br>D-F7□WV<br>D-F7BAL | D-F7LF<br>D-F79F |
|---|---|---|---|
| **6** | 6 | 3 | 4.5 |
| **10** | 6 | 3 | 4.5 |
| **15** | 6 | 4 | 4.5 |
| **20** | 6 | 3 | 4.5 |
| **25** | 6 | 3 | 4.5 |
| **32** | 6 | 3 | 4.5 |
| **40** | 6 | 3.5 | 4.5 |

Note) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment. (variations on the order of ±30%)

## Auto Switch Mounting

When mounting an auto switch, the switch mounting screw should be screwed into a hexagon nut (M3) which has been inserted into the groove of the switch rail.
(Tightening torque should be about 0.05 to 0.1 N/m.)



# Magnetically Coupled Rodless Cylinder/High Precision Guide

# Series CY1H

## How to Order

□ **CY1H** □ **25** — **300** □ — **Z73** □

**Port size** (ø20 to ø32)

| | |
|---|---|
| — | Rc(PT) |
| **E** | G(PF) |

**High precision guide**

**Guide**

| Symbol \ Bore (mm) | | 10 | 15 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| — | 1 axis | ● | ● | ● | ● | — |
| **T** | 2 axes | — | — | — | ● | ● |

**Bore size**

| | |
|---|---|
| **10** | 10mm |
| **15** | 15mm |
| **20** | 20mm |
| **25** | 25mm |
| **32** | 32mm |

**Standard stroke (mm)**

Refer to the standard stroke table on p.3.28-49.

**Stroke adjustment**

| | |
|---|---|
| — | With adjustment bolt |
| **B** | With shock absorber (2 pcs.) |
| **BS** | With shock absorber (1 pc. on port side) |

∗ The adjustment bolt is installed even when B or BS is selected. (except for ø10)

**Auto switch**

| | |
|---|---|
| — | Without auto switch |

∗ Refer to the table below for auto switch part numbers.

**Number of auto switches**

| | |
|---|---|
| — | 2 |
| **S** | 1 |
| **n** | n |

**Application Auto Switches/**Refer to p.5.3-2 for further information on auto switch.

| Style | Special function | Electrical entry | Indicator | Wiring (output) | Load voltage | | | Auto switch model | | Lead wire (m) (1) | | | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | DC | | AC | Electrical entry direction | | 0.5 (—) | 3 (L) | 5 (Z) | | |
| | | | | | | | | Perp. | In-line | | | | | |
| Reed switch | — | Grommet | Yes | 3 wire (Equiv. NPN) | — | 5V | — | — | **Z76** | ● | ● | — | IC | — |
| | | | | 2 wire | 24V | 12V | 100V | — | **Z73** | ● | ● | ● | — | Replay PLC |
| | | | No | | | 5V, 12V | 100V or less | — | **Z80** | ● | ● | — | IC | |
| Solid state switch | — | Grommet | Yes | 3 wire (NPN) | 24V | 5V, 12V | — | **Y69A** | **Y59A** | ● | ● | ○ | IC | Replay PLC |
| | | | | 3 wire (PNP) | | | | **Y7PV** | **Y7P** | ● | ● | ○ | | |
| | | | | 2 wire | | 12V | | **Y69B** | **Y59B** | ● | ● | ○ | — | |
| | Diagnostic indicator (2 colour ) | | | 3 wire (NPN) | | 5V, 12V | | **Y7NWV** | **Y7NW** | ● | ● | ○ | IC | |
| | | | | 3 wire (PNP) | | | | **Y7PWV** | **Y7PW** | ● | ● | ○ | | |
| | | | | 2 wire | | 12V | | **Y7BWV** | **Y7BW** | ● | ● | ○ | — | |

Note 1) Lead wire length 0.5m ·····— (Example) Y59A
3m·····L (Example) Y59AL
5m·····Z (Example) Y59AZ

Note 2) Solid state switches marked with a "○" are manufactured upon receipt of order.

## Specifications

| Bore size (mm) | 10 | 15 | 20 | 25 | 32 |
|---|---|---|---|---|---|
| Fluid | Air | | | | |
| Action | Double acting | | | | |
| Maximum operating pressure | 0.7MPa | | | | |
| Minimum operating pressure | 0.2MPa | | | | |
| Proof pressure | 1.05MPa | | | | |
| Ambient and fluid temperature | –10 to 60°C | | | | |
| Piston speed | 70 to 1000mm/s | | | | |
| Cushion (external stopper) | Urethane bumpers on both sides (standard), Shock absorber (option) | | | | |
| Lubrication | Non-lube | | | | |
| Stroke length tolerance | 0 to 1.8mm | | | | |
| Piping | Centralized piping | | | | |
| Piping port size | M5 | | Rc(PT)1/8 | | |

## Standard Stroke

| Bore size (mm) | Number of axes | Standard stroke (mm) | Maximum (1) available stroke (mm) |
|---|---|---|---|
| 10 | 1 axis | 100, 200, 300 | 500 |
| 15 | | 100, 200, 300, 400, 500 | 750 |
| 20 | | 100, 200, 300, 400, 500, 600 | 1000 |
| 25 | | 100, 200, 300, 400, 500, 600, 800 | 1200 |
| 25 | 2 axes | 100, 200, 300, 400, 500, 600, 800, 1000 | |
| 32 | | | 1500 |

Note 1) Contact SMC if the maximum stroke is exceeded.

## Magnetic Holding Force

| Bore size (mm) | 10 | 15 | 20 | 25 | 32 |
|---|---|---|---|---|---|
| Holding force (N) | 53.9 | 137 | 231 | 363 | 588 |

## Theoretical Force

(N)

| Bore size (mm) | Piston area ($mm^2$) | Operating pressure (MPa) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| 10 | 78 | 15 | 23 | 31 | 39 | 46 | 54 |
| 15 | 176 | 35 | 52 | 70 | 88 | 105 | 123 |
| 20 | 314 | 62 | 94 | 125 | 157 | 188 | 219 |
| 25 | 490 | 98 | 147 | 196 | 245 | 294 | 343 |
| 32 | 804 | 161 | 241 | 322 | 402 | 483 | 563 |

Note)

Theoretical force (N) = Pressure (MPa) x Piston area ($mm^2$).

## Weight

(kg)

| Model | Standard stroke (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 100 | 200 | 300 | 400 | 500 | 600 | 800 | 1000 |
| CY1H10 | 1.0 | 1.3 | 1.6 | — | — | — | — | — |
| CY1H15 | 2.2 | 2.7 | 3.2 | 3.6 | 4.1 | — | — | — |
| CY1H20 | 3.0 | 3.5 | 4.0 | 4.4 | 4.9 | 5.4 | — | — |
| CY1H25 | 4.6 | 5.3 | 6.0 | 6.6 | 7.3 | 8.0 | 9.4 | — |
| CY1HT25 | 5.1 | 6.2 | 7.3 | 8.3 | 9.4 | 10.4 | 12.5 | 14.6 |
| CY1HT32 | 8.4 | 9.6 | 10.7 | 11.9 | 13.0 | 14.2 | 16.5 | 18.8 |

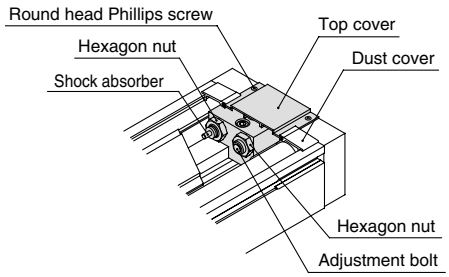
## Shock Absorber Specifications

| Applicable cylinder size (mm) | | 10 | 15 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Shock absorber model | | RB0805 | RB0806 | RB1006 | RB1411 | RB2015 |
| Maximum energy absorption (J) | | 0.98 | 2.94 | 3.92 | 14.7 | 58.8 |
| Stroke absorption (mm) | | 5 | 6 | 6 | 11 | 15 |
| Impact speed (m/s) | | 0.05 to 5 | | | | |
| Max. operating frequency (cycle/min)* | | 80 | | 70 | 45 | 25 |
| Spring force (N) | Extended | 1.96 | | 4.22 | 6.86 | 8.34 |
| | Compressed | 3.83 | 4.22 | 6.18 | 15.30 | 20.50 |
| Weight (g) | | 15 | | 25 | 65 | 150 |

* Indicates the time of maximum energy absorption per cycle. Therefore, the operating frequency can be increased according to the energy absorption.

## Stroke Adjustment

Loosen the round head Phillips Screws, and remove the top cover and dust covers (4pcs.).



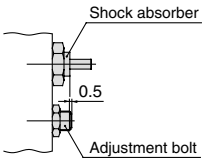

Loosen the hexagon nut, adjust the stroke with a wrench from the plate side, and secure by retightening the nut. When there is a shock absorber, loosen the hexagon nut, adjust the stroke, and then retighten the nut. Adjustment should be performed to make effective use of the shock absorber's absorption capacity, with its position relative to the adjustment bolt as shown in the drawing to the right.

### ⚠ Caution

If the effective stroke of the shock absorber is shortened by the stroke adjustment, its absorption capacity will be drastically reduced. Therefore, the adjustment bolt should be secured at a position where it projects about 0.5mm farther than the shock absorber.

**Lock nut tightening torque** (Nm)

| Model | Shock absorber | Adjustment bolt |
|---|---|---|
| CY1H10 | 1.67 | 1.67 |
| CY1H15 | | |
| CY1H20 | 3.14 | |
| CY1H25 | 10.8 | 3.14 |
| CY1HT25 | | |
| CY1HT32 | 23.5 | |




After completing the above adjustment, replace the top cover and dust covers back into place. The screws for securing the top cover should be tightened with a torque of 0.58N·m.

# ⚠ Precautions

**Be sure to read before handling. Refer to p.0-39 to 0-43 for Safety Instructions and actuator precautions.**

### Mounting

### ⚠ Caution

**① The interior is protected to a certain extent by the top cover, however, when performing maintenance, etc., take care not to scratch or damage the cylinder tube, slide table or linear guide by striking them or placing objects on them.**

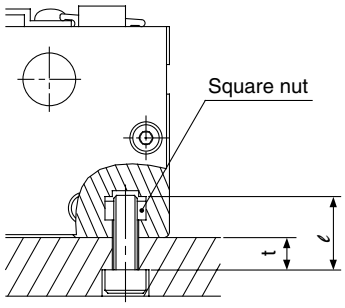
The bore and exterior of tubes are manufactured to precise tolerances, so that even a slight deformation can cause malfunction.

**② Since the slide table is supported by precision bearings, strong impacts or large moment, etc. should not be applied when mounting work pieces.**

**③ Mounting of the cylinder body**

The body is mounted using the square nuts, which are included, in the two T-grooves on the bottom of the body. Refer to the table below for mounting bolt dimensions and fastening torque.

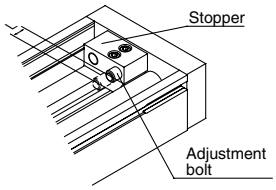
| Model | | CY1H10 | CY1H15 | CY1H20 | CY1H25 | CY1HT25 | CY1HT32 |
|---|---|---|---|---|---|---|---|
| Bolt dimensions | Screw size | M4 | M5 | | M6 | | M8 |
| | Dimension t | ℓ-7 | ℓ-8 | ℓ-8 | ℓ-9 | | ℓ-12 |
| Fastening torque | Nm | 1.37 | 2.65 | | 4.4 | | 13.2 |




**④ Stroke adjustment**

Stroke adjustment on one side of 15mm (CY1H10, 15, 20) or 30mm (CY1H25, CY1HT25, CT1HT32) can be performed with the adjustment bolt, but when the amount of adjustment exceeds 3mm, the magnetic coupling may be broken depending on the operating conditions. Therefore, operation should confirm to the intermediate stop conditions on p.3.28-54.

Moreover, the stroke should not be adjusted by moving the stopper, as this can cause damage to the cylinder.




(mm)

| Model | Stroke adjustment range L |
|---|---|
| CY1H10, CY1H15, CY1H20 | 01 to 5 |
| CY1H25, CY1HT25, CY1HT32 | 0 to 30 |

### Operation

### ⚠ Caution

**① The unit can be used with a direct load with in the allowable range, but when connecting to a load which has an external guide mechanism, careful alignment is necessary.**

Since variation of the shaft center increases as the stroke becomes longer, a connection method should be devised which can assimilate this displacement.

**② Since the guide is adjusted at the time of shipment, unintentional movement of the adjustment setting should be avoided.**

**③ This unit can be operated without lubrication. If lubrication is performed, use class 1 turbine oil (without additives) ISO VG32. (Machine oil and spindle oil cannot be used).**

**④ Contact SMC before operating in a environment where there will be contact with cutting chips, dust (paper scraps, thread scraps, etc.) or cutting of oil (gas oil, water, salt water, etc.).**

**⑤ Do not operate with the magnetic coupling out of position.**

In case the magnetic coupling is out of position, push the external slider back into the correct position by hand at the end of the stroke (or correct the piston slider with air pressure).

**⑥ Do not disassemble the magnetic components (piston slider, external slider).**

This can cause a loss of holding power and malfunction.

# How to Select ①

**E**: Kinetic energy of load (J)

$$E = \frac{W}{2} \times \left(\frac{V}{1000}\right)^2$$

**Es**: Allowable kinetic energy for intermediate stop using an air pressure circuit (J)

**Ps**: Operating pressure limit for intermediate stop using an external stopper, etc. (MPa)

**Pv**: Maximum operating pressure for vertical operation (MPa)

**Wv**: Allowable load weight for vertical operation (kg)

$\alpha$: Load factor

$$\Sigma\alpha = \frac{\text{Load weight (W)}}{\text{Max. load weight (Wmax)}} + \frac{\text{Static moment (M)}}{\text{Allowable static moment (Mmax)}} + \frac{\text{Dynamic moment (Me)}}{\text{Allowable dynamic moment (Memax)}}$$

**Operating conditions**

- W: Load weight (kg)
- V: Speed (mm/s)
- P: Operating pressure (MPa)
- Stroke (mm)
- Position of work piece centre of gravity (m)
- Mode of operation (horizontal, inclined, vertical)

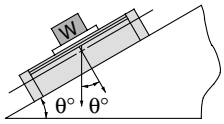
Mode of operation

- Horizontal operation
- Inclined operation
- Vertical operation (1)

Review of load weight and operating pressure

**First tentative bore size determination**

- Horizontal: $\phi D \geqq 1.6 \times \sqrt{\frac{W}{P}}$
- Inclined: $\phi D \geqq 5.0 \times \sqrt{\frac{0.1 \times W\cos\theta + W\sin\theta}{P}}$
- Vertical: $\phi D \geqq 5.0 \times \sqrt{\frac{0.1 \times W + W}{P}}$



Inclined operation

Determination of allowable load weight & pressure

- $W > W_v$ or $P > P_v$: (Refer to p.3.28-54 for vertical operation.)
- $W \leqq W_v$, $P \leqq P_v$

(Refer to p.3.28-53)

Determination of load factor ($\Sigma\alpha$)

- $\Sigma\alpha > 1$: Review of operating conditions
- $\Sigma\alpha \leqq 1$

Intermediate stop? (1)

- Yes
  - Intermediate stopping method
    - Stop with external stopper
    - Stop with air pressure circuit (Refer to p.3.28-54 for intermediate stops.)
  - Determination of load's kinetic energy (E) $E = \frac{W}{2} \times \left(\frac{V}{1000}\right)^2$
    - $E > Es$: Review of larger bore size
    - $E \leqq Es$
  - Determination of pressure (P) when making intermediate stop
    - $P > Ps$: Review of larger bore size operating pressure
    - $P \leqq Ps$ (Refer to p.3.28-54 for intermediate stops.)
- No

Bore size determination

Consider order made products based on operating conditions (2) (Refer to p.5.4-1 and 5.4-79.)

**Model determination**

Note 1) This cylinder cannot perform an intermediate stop using an air pressure circuit in vertical operation. In this case, an intermediate stop can be performed only by using an external stopper, etc.

Note 2) Depending on the operating environment, etc., order made products should also be considered.

# Series CY1H
# How to Select ②

## Precautions on Design ①

The maximum load weight and allowable moment will differ depending on the work piece mounting method, cylinder mounting orientation and piston speed.
A determination of suitability for use is performed based on the operating limit values in the graphs with respect to operating conditions, but the total (Σαn) of the load factors (αn) for each weight and moment should not exceed 1.

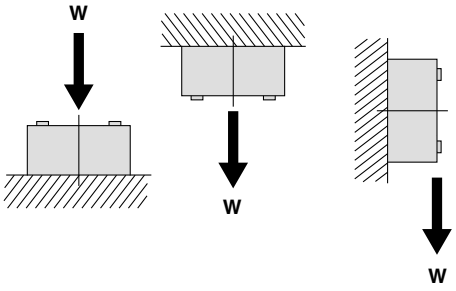
$$\Sigma\alpha n = \frac{\text{Load weight (W)}}{\text{Max. load weight (Wmax)}} + \frac{\text{Static moment (M)}}{\text{Allowable static moment (Mmax)}} + \frac{\text{Dynamic moment (Me)}}{\text{Allowable dynamic moment (Memax)}} \leqq 1$$

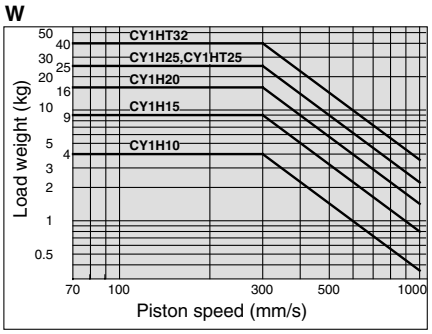
Each of the values Wmax, Mmax and Me max are found in Graphs 1, 2 and 3 below.

## Load weight

**Max. load weight** (kg)

| Model | $W_{max}$ |
|---|---|
| **CY1H10** | 4.0 |
| **CY1H15** | 9.0 |
| **CY1H20** | 16.0 |
| **CY1H25** | 25.0 |
| **CY1HT25** | |
| **CY1HT32** | 40.0 |



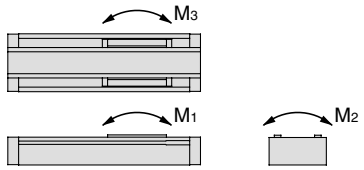

**<Graph 1>**

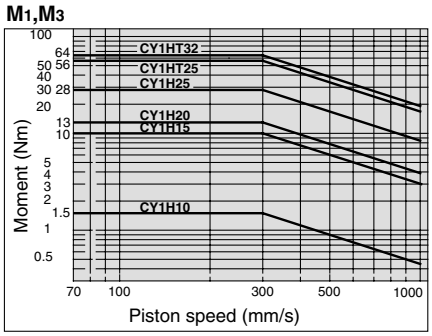
## Moment

### Allowable moment

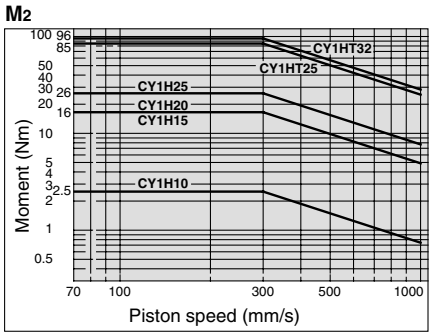
**(Static moment/Dynamic moment)** (Nm)

| Model | $M_1$ | $M_2$ | $M_3$ | Model | $M_1$ | $M_2$ | $M_3$ |
|---|---|---|---|---|---|---|---|
| **CY1H10** | 1.5 | 2.5 | 1.5 | **CY1H25** | 28 | 26 | 28 |
| **CY1H15** | 10 | 16 | 10 | **CY1HT25** | 56 | 85 | 56 |
| **CY1H20** | 13 | 16 | 13 | **CY1HT32** | 64 | 96 | 64 |




**<Graph 2>**

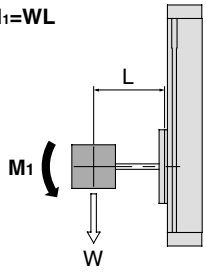



**<Graph 3>**

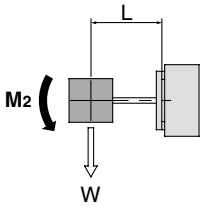
### Static moment

Moment generated by the dead weight of the load even when the cylinder is stopped.

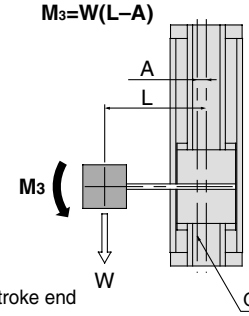
■ **Pitch moment**
**$M_1$=WL**




■ **Roll moment**
**$M_2$=WL**




■ **Yaw moment**
**$M_3$=W(L–A)**




(mm)

| Model | A |
|---|---|
| **CY1H10** | 15 |
| **CY1H15** | 17.5 |
| **CY1H20** | 19.5 |
| **CY1H25** | 23.5 |
| **CY1HT25** | 0 * |
| **CY1HT32** | 0 * |

* Since there are 2 guides, the guides' central axis and the cylinder's central axis are the same.

### Dynamic moment

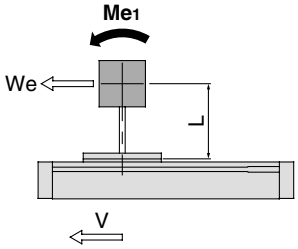
Moment generated by the load equivalent to the impact at the stroke end

We=δWV
V =1.4Va

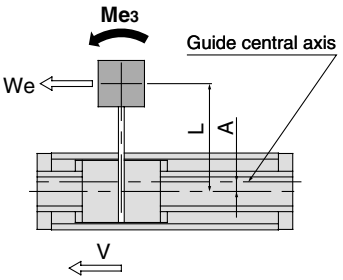
We: Load equivalent to impact [N]
δ : Bumper coefficient
With adjustment bolt (standard) = 4/100
With shock absorber = 1/100
W : Load weight [kg]
V : Impact speed [mm/s]
Va: Average speed [mm/s]

■ **Pitch moment**
**$Me_1$= 1/3*WeL**

* **Average load coefficient**




■ **Yaw moment**
**$Me_3$= 1/3*We(L–A)**




(mm)

| Model | A |
|---|---|
| **CY1H10** | 15 |
| **CY1H15** | 17.5 |
| **CY1H20** | 19.5 |
| **CY1H25** | 23.5 |
| **CY1HT25** | 0 * |
| **CY1HT32** | 0 * |

* Since there are 2 guides, the guides' central axis and the cylinder's central axis are the same.

# How to Select ③

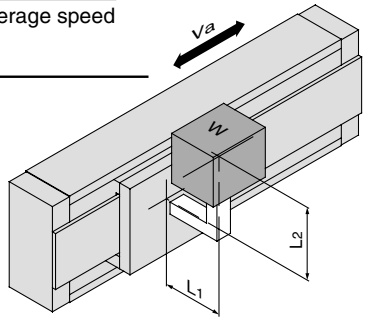
## Selection calculation

The selection calculation finds the load factors ($\alpha n$) of the items below, where the total ($\Sigma\alpha n$) does not exceed 1.

$$\Sigma\alpha n = \alpha_1 + \alpha_2 + \alpha_3 \geqq 1$$

| Item | Load factor $\alpha n$ | Note |
|---|---|---|
| 1 Max. load weight | $\alpha_1$=W/Wmax | Investigate W<br>Wmax is the max. load weight for Va |
| 2 Static moment | $\alpha_2$=M/Mmax | Investigate M1, M2, M3<br>Mmax is the allowable moment for Va |
| 3 Dynamic moment | $\alpha_3$=Me/Memax | Investigate Me1, Me3<br>Memax is the allowable moment for V |

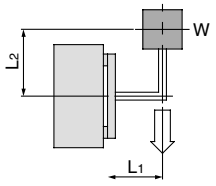
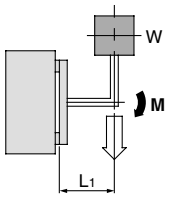
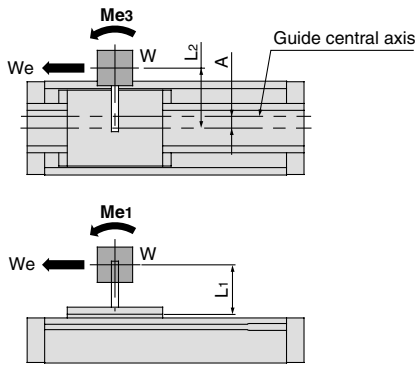
V: Impact speed Va: Average speed




### Calculation examples

**Operating conditions**

Cylinder: CY1H15
Cushion: Standard (adjustment bolt)
Mounting: Horizontal wall mounting
Speed (average): Va = 300 [mm/s]
Load weight: W = 1 [kg] (excluding weight of arm section)
$L_1$ = 50 [mm]
$L_2$ = 50 [mm]

| Item | Load factor $\alpha n$ | Note |
|---|---|---|
| **1 Maximum load weight**  | $\alpha_1$ = W/Wmax<br>= 1/9<br>**= 0.111** | Investigate W.<br>Find the value of Wmax when Va = 300mm/s from <Graph 1>. |
| **2 Static moment**  | $M_2$ = $WL_1$ W=1[kg]<br>= 10 0.05 =10[N]<br>= 0.5[Nm]<br>$\alpha_2$ = $M_2/M_2$ max<br>= 0.5/16<br>**= 0.031** | Investigate $M_2$.<br>Since $M_1$ & $M_3$ are not generated, investigation is unnecessary.<br>Find the value of $M_2$max when Va = 300mm/s from <Graph 3>. |
| **3 Dynamic moment**  | From V = 1.4Va<br>We = δWV<br>= 4/100 10 1.4 300<br>= 168[N]<br>$Me_3$ = 1/3We($L_2$-A)<br>= 1/3 168 0.032<br>= 1.8[Nm]<br>$\alpha_3$ = $Me_3/Me_3$max<br>= 1.8/7.2<br>**= 0.250** | Investigate Me3.<br>Find the load equivalent to impact We.<br>Bumper coefficient δ = 4/100 (urethane bumper)<br>Find the value of Me3max when V = 1.4 and Va = 420mm/s from <Graph 2>. |
| | $Me_1$ = 1/3We $L_1$<br>= 1/3168 0.05<br>= 2.8[Nm]<br>$\alpha_4$ = $Me_1/Me_1$ max<br>= 2.8/7.2<br>**= 0.389** | Investigate Me1.<br>Form above, We = 168<br>Find the value of Me3max when V = 1.4 and Va = 420mm/s from <Graph 2>. |

$\Sigma\alpha n = \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4$
$= 0.111 + 0.031 + 0.250 + 0.389$
$= 0.781$
Can be used based on $\Sigma\alpha n = 0.781 \leqq 1$

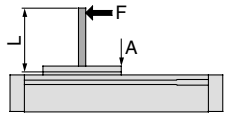
# How to Select ④

## Precautions on Design ②

### Table Deflection

**Displacement of table due to pitch moment load**

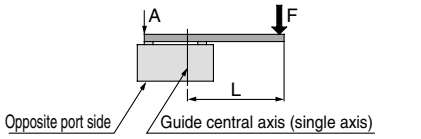
**Displacement of Section A when force acts on Section F**




**$M_1$=FXL**

**Displacement of table due to roll moment load**

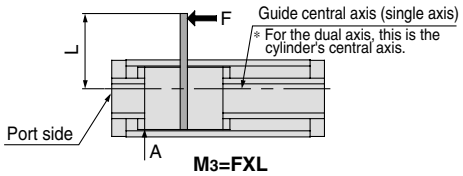
**Displacement of Section A when force acts on Section F**




**$M_2$=FXL**

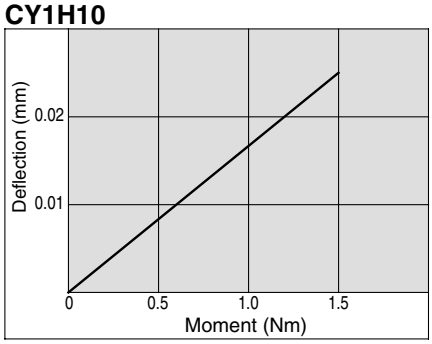
**Displacement of table due to yaw moment load**

**Displacement of Section A when force acts on Section F**

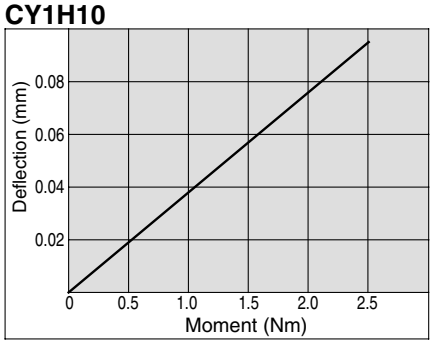



**$M_3$=FXL**

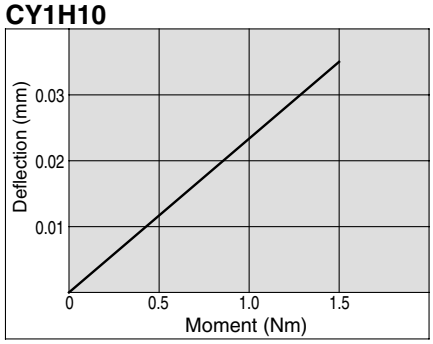
**CY1H10**



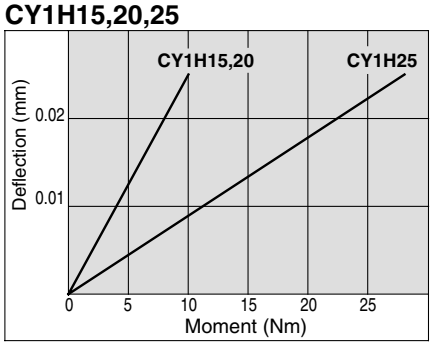

**CY1H10**



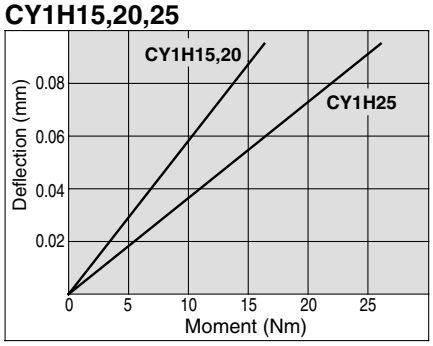

**CY1H10**



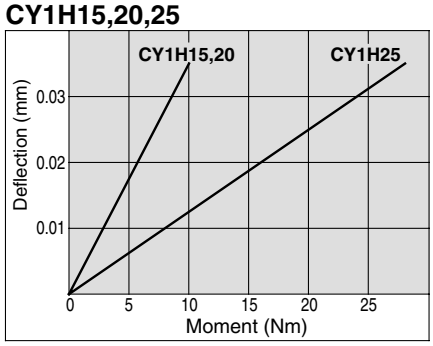

**CY1H15,20,25**



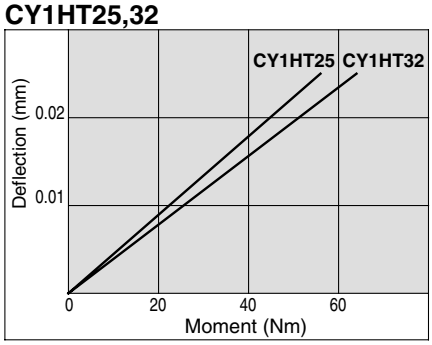

**CY1H15,20,25**



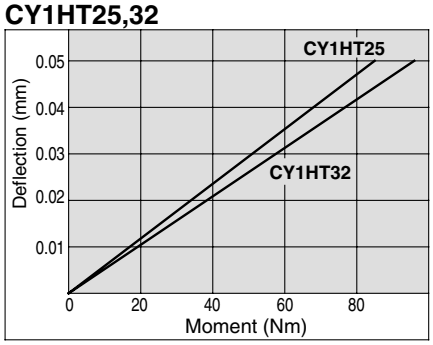

**CY1H15,20,25**



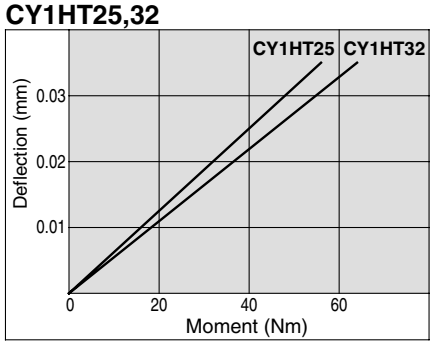

**CY1HT25,32**




**CY1HT25,32**




**CY1HT25,32**




## Vertical Operation

When using in vertical Operation, prevention of work piece dropping due to breaking of the magnetic coupling should be considered. The allowable load weight and maximum operating pressure should be as shown in the table below.

| Model | Allowable load weight Wv(kg) | Max. operating press. Pv(MPa) |
|---|---|---|
| **CY1H10** | 2.7 | 0.55 |
| **CY1H15** | 7.0 | 0.65 |
| **CY1H20** | 11.0 | 0.65 |
| **CY1H25** | 18.5 | 0.65 |
| **CY1HT25** | 18.5 | 0.65 |
| **CY1HT32** | 30.0 | 0.65 |

## Intermediate Stops

**1) Intermediate stops of load with an external stopper, etc.**

When stopping a load in mid-stroke using an external stopper, etc., operate within the operating pressure limits shown in the table below. The magnetic coupling will break if operated at a pressure exceeding these limits.

| Model | Operating pressure limit for intermediate stop Ps(MPa) |
|---|---|
| **CY1H10** | 0.55 |
| **CY1H15** | 0.65 |
| **CY1H20** | 0.65 |
| **CY1H25** | 0.65 |
| **CY1HT25** | 0.65 |
| **CY1HT32** | 0.65 |

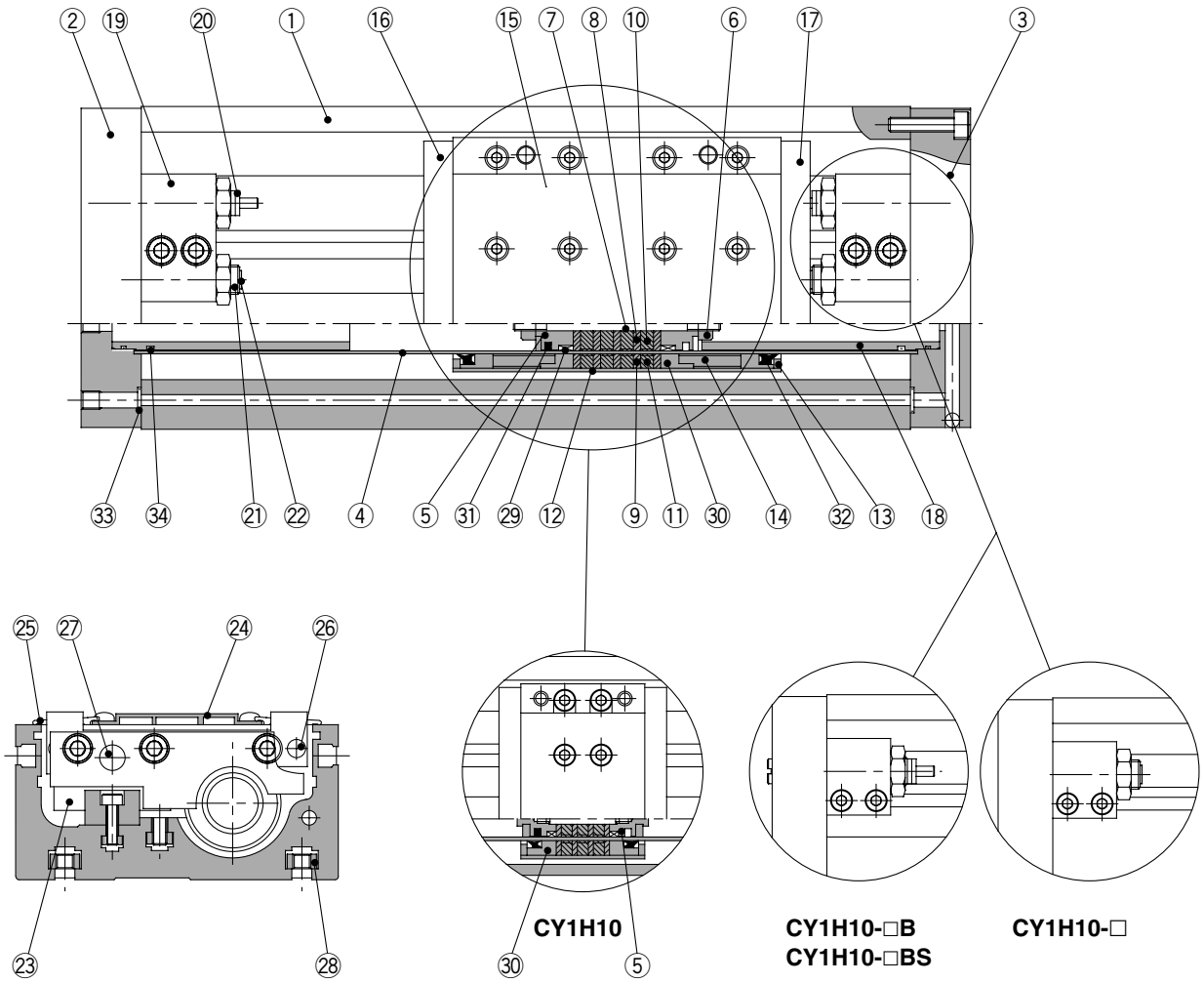
**2) Intermediate stops of load with an air pressure circuit**

When stopping a load using an air pressure circuit, operate at or below the kinetic energy shown in the table below. The magnetic coupling will break if the allowable value is exceeded.

| Model | Allowable kinetic energy for intermediate stop Es(J) |
|---|---|
| **CY1H10** | 0.03 |
| **CY1H15** | 0.13 |
| **CY1H20** | 0.24 |
| **CY1H25** | 0.45 |
| **CY1HT25** | 0.45 |
| **CY1HT32** | 0.88 |

## Construction

### Single axis/CY1H




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Body | Aluminum alloy | Hard anodized |
| ② | Plate A | Aluminum alloy | Hard anodized |
| ③ | Plate B | Aluminum alloy | Hard anodized |
| ④ | Cylinder tube | Stainless steel | |
| ⑤ | Piston | Brass | Electroless nickel plated(CY1H10, 15) |
| | | Aluminum alloy | Chromated (CY1H20, 25) |
| ⑥ | Piston nut | Carbon steel | Zinc chromated (except CY1H10, 15) |
| ⑦ | Shaft | Stainless steel | |
| ⑧ | Piston side yoke | Rolled steel plate | Zinc chromated {( ) for CY1H10} |
| ⑨ | External slider side yoke | Rolled steel plate | Zinc chromated {( ) for CY1H10} |
| ⑩ | Magnet A | Rare earth magnet | ( ) for CY1H10 |
| ⑪ | Magnet B | Rare earth magnet | ( ) for CY1H10 |
| ⑫ | External slider tube | Aluminum alloy | |
| ⑬ | Spacer | Rolled steel plate | Nickel plated |
| ⑭ | Space ring | Aluminum alloy | Chromated (except CY1H10) |
| ⑮ | Slide table | Aluminum alloy | Hard anodized |
| ⑯ | Side plate A | Aluminum alloy | Hard anodized |
| ⑰ | Side plate B | Aluminum alloy | Hard anodized |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑱ | Internal stopper | Aluminum alloy | Anodized |
| ⑲ | Stopper | Aluminum alloy | Anodized |
| ⑳ | Shock absorber | — | Series RB |
| ㉑ | Adjustment bolt | Chrome molybdenum steel | Nickel plated |
| ㉒ | Adjustment bumper | Urethane rubber | |
| ㉓ | Linear guide | — | |
| ㉔ | Top cover | Aluminum alloy | Hard anodized |
| ㉕ | Dust cover | Special resin | |
| ㉖ | Magnet (for auto switch) | Rare earth magnet | |
| ㉗ | Parallel pin | Carbon steel | Nickel plated |
| ㉘ | Square nut for body mounting | Carbon steel | Nickel plated |
| ㉙* | Wear ring A | Special resin | |
| ㉚* | Wear ring B | Special resin | ( ) for CY1H10 |
| ㉛* | Piston seal | NBR | |
| ㉜* | Scraper | NBR | |
| ㉝* | O ring | NBR | |
| ㉞* | O ring | NBR | |

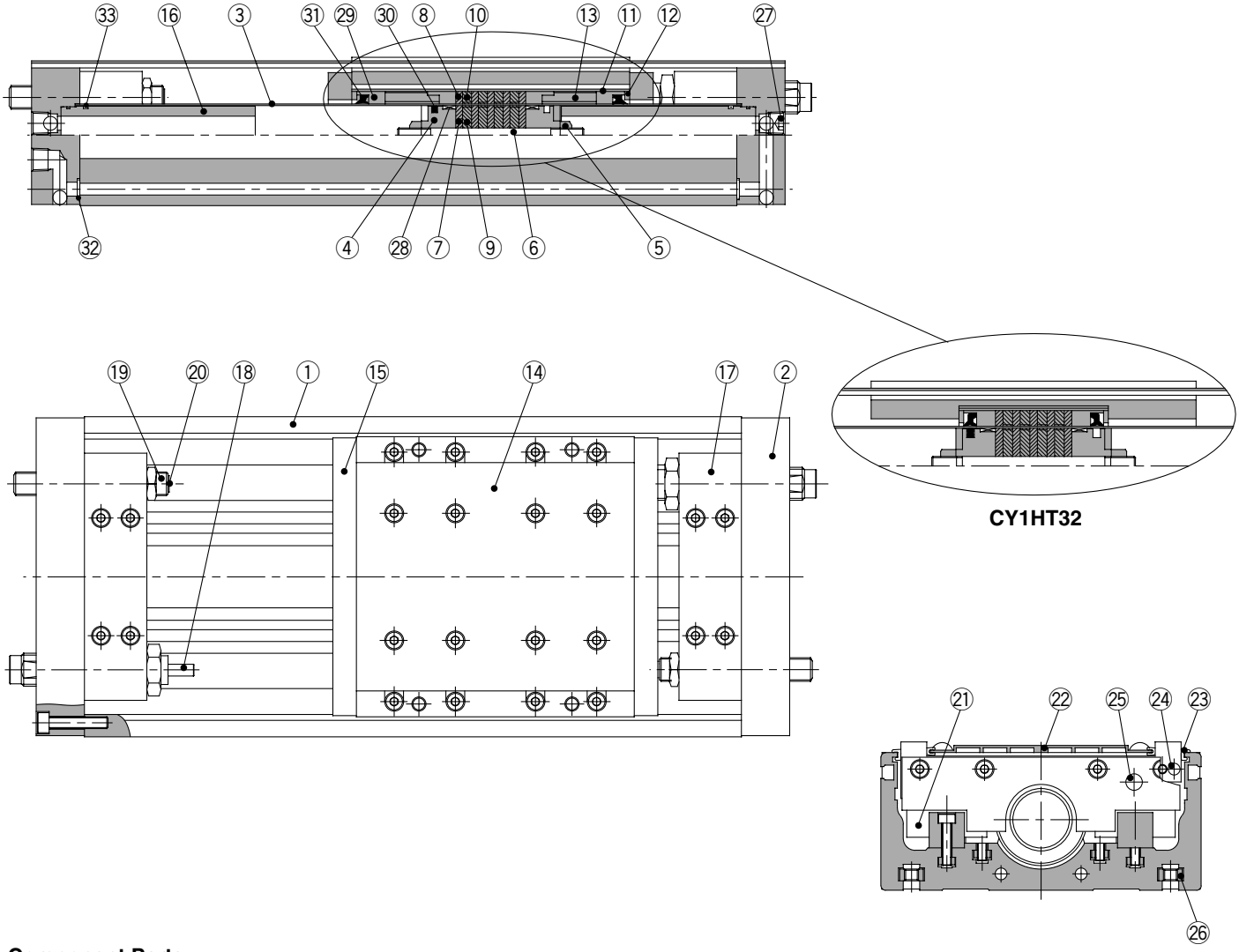
### Replacement Parts: Seal kits

| Bore size (mm) | Kit No. | Content |
|---|---|---|
| **10** | CY1H10-PS | Above Nos. ㉙, ㉚, ㉛, ㉜, ㉝, ㉞ |
| **15** | CY1H15-PS | |
| **20** | CY1H20-PS | |
| **25** | CY1H25-PS | |

∗ Seal kits are sets consisting of items ㉙ to ㉞, and can be ordered using the order number for each bore size.

## Construction

### Dual axis/CY1HT




**Component Parts**

| No. | Description | Material | Qty. | Note |
|---|---|---|---|---|
| ① | Body | Aluminum alloy | 1 | Hard anodized |
| ② | Plate | Aluminum alloy | 2 | Hard anodized |
| ③ | Cylinder tube | Stainless steel | 1 | |
| ④ | Piston | Aluminum alloy | 2 | Chromated |
| ⑤ | Piston nut | Carbon steel | 2 | Zinc chromated |
| ⑥ | Shaft | Stainless steel | 1 | |
| ⑦ | Piston side yoke | Rolled steel plate | 5 | Zinc chromated |
| ⑧ | External slider side yoke | Rolled steel plate | 5 | Zinc chromated |
| ⑨ | Magnet A | Rare earth magnet | 4 | |
| ⑩ | Magnet B | Rare earth magnet | 4 | |
| ⑪ | External slider tube | Aluminum alloy | 1 | |
| ⑫ | Spacer | Rolled steel plate | 2 | Nickel plated |
| ⑬ | Space ring | Aluminum alloy | 2 | Chromated (except CY1HT32) |
| ⑭ | Slide table | Aluminum alloy | 1 | Hard anodized |
| ⑮ | Side plate | Aluminum alloy | 2 | Hard anodized (except CY1HT32) |
| ⑯ | Internal stopper | Aluminum alloy | 2 | Anodized |
| ⑰ | Stopper | Aluminum alloy | 2 | Anodized |

| No. | Description | Material | Qty. | Note |
|---|---|---|---|---|
| ⑱ | Shock absorber | — | 2 | Series RB |
| ⑲ | Adjustment bolt | Chrome molybdenum steel | 2 | Nickel plated |
| ⑳ | Adjustment bumper | Urethane rubber | 2 | |
| ㉑ | Linear guide | — | 2 | |
| ㉒ | Top cover | Aluminum alloy | 1 | Hard anodized |
| ㉓ | Dust cover | Special resin | 4 | |
| ㉔ | Magnet (for auto switch) | Rare earth magnet | 2(4) | ( ) for CY1HT32 |
| ㉕ | Parallel pin | Stainless steel | 2 | |
| ㉖ | Square nut for body mounting | Carbon steel | 4 | Nickel plated |
| ㉗ | Hex socket taper plug | Carbon steel | 2 | Nickel plated |
| ㉘* | Wear ring A | Special resin | 2 | |
| ㉙* | Wear ring B | Special resin | 4(2) | ( ) for CY1HT32 |
| ㉚* | Piston seal | NBR | 1 | |
| ㉛* | Scraper | NBR | 2 | |
| ㉜* | O ring | NBR | 4 | |
| ㉝* | O ring | NBR | 2 | |

**Replacement Parts: Seal kits**

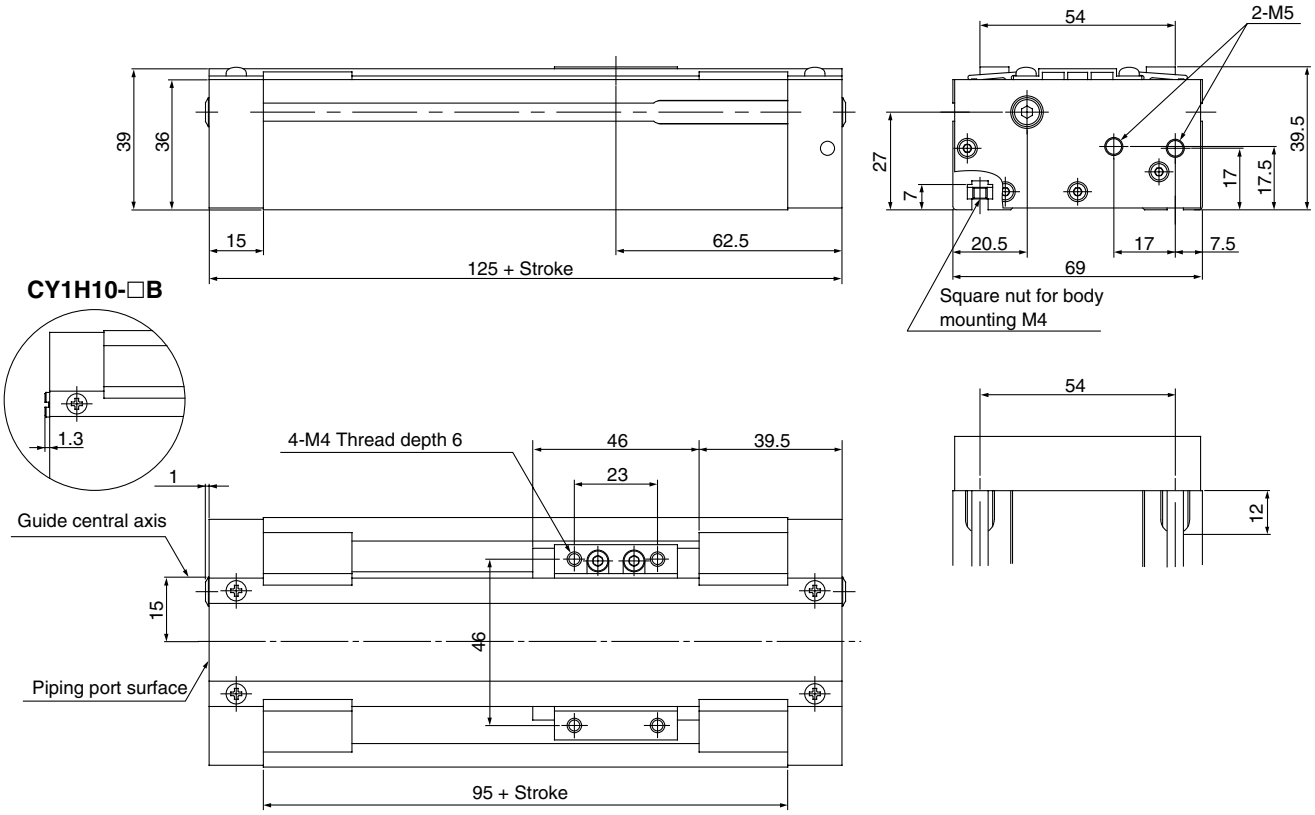
| Bore size (mm) | Kit No. | Content |
|---|---|---|
| **25** | CY1HT25-PS | Above Nos. ㉘, ㉙, ㉚, ㉛, ㉜, ㉝ |
| **32** | CY1HT32-PS | |

* Seal kits are sets consisting of items ㉘ to ㉝, and can be ordered using the order number for each bore size.

## Dimensions

### Single axis/ø10

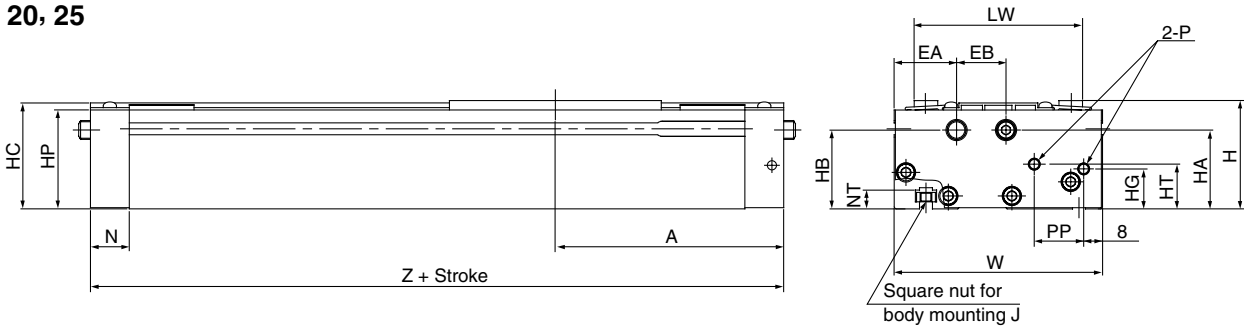
**CY1H10**

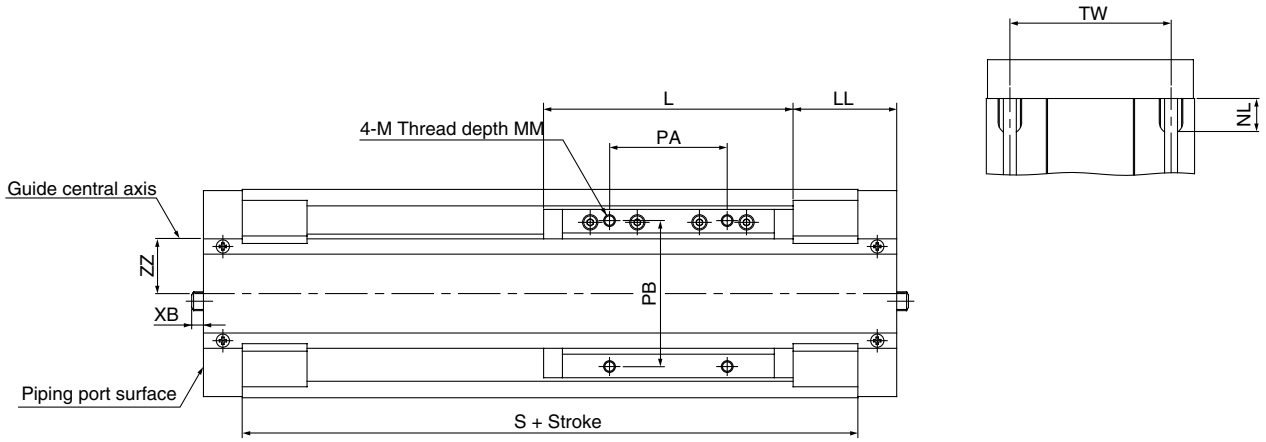


## Dimensions

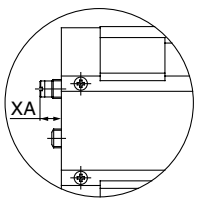
### Single axis/ø15, ø20, ø25

**CY1H15, 20, 25**




**CY1H 15 20 25 -□B**



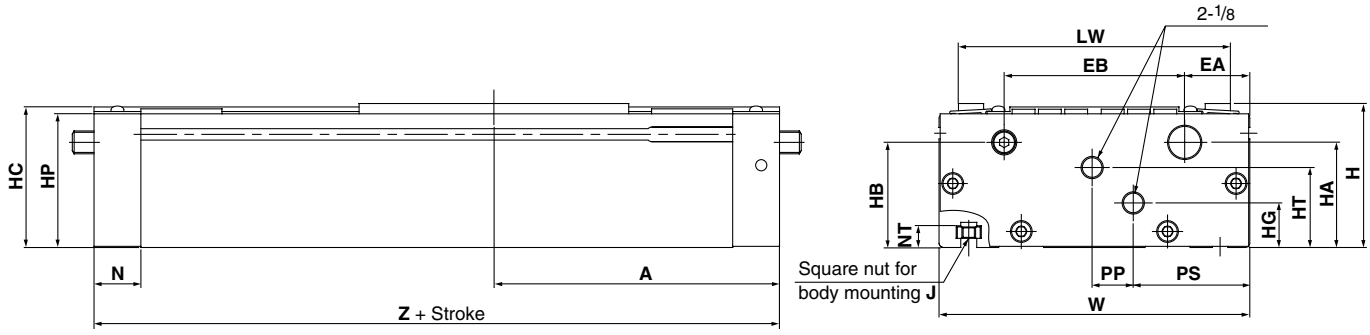

(mm)

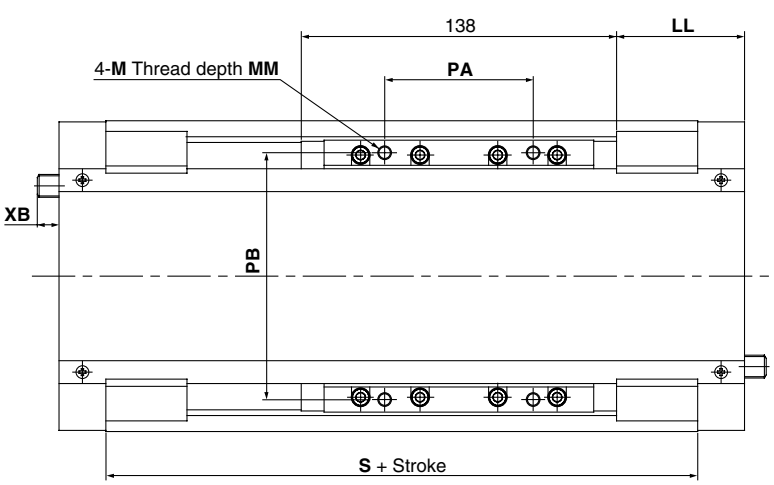
| Model | A | EA | EB | H | HA | HB | HC | HG | HP | HT | J | L | LL | LW | M | MM | N | NL | NT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1H15** | 97 | 26.5 | 21 | 46 | 33.5 | 33.5 | 45 | 17 | 42 | 19 | M5 | 106 | 44 | 71.5 | M5 | 8 | 16.5 | 15 | 8 |
| **CY1H20** | 102.5 | 26.5 | 22 | 54 | 42.5 | 41.5 | 53 | 16 | 50 | 23.5 | M5 | 108 | 48.5 | 75.5 | M5 | 8 | 18 | 15 | 8 |
| **CY1H25** | 125 | 29 | 24 | 63 | 46 | 46 | 61.5 | 25 | 58.5 | 28 | M6 | 138 | 56 | 86 | M6 | 10 | 20.5 | 18 | 9 |

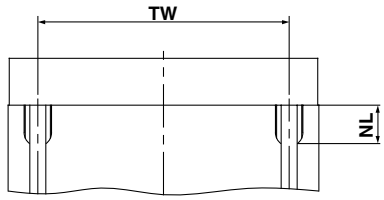
| Model | P | PA | PB | PP | S | TW | W | XA | XB | Z | ZZ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1H15** | M5 | 50 | 62 | 21 | 161 | 65 | 88.5 | — | — | 194 | 17.5 |
| **CY1H20** | 1/8 | 50 | 65 | 23 | 169 | 70 | 92.5 | — | — | 205 | 19.5 |
| **CY1H25** | 1/8 | 65 | 75 | 27 | 209 | 75 | 103 | 11.3 | 9.5 | 250 | 23.5 |

**Dual axis/ø25, ø32**

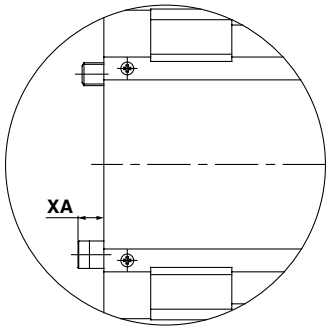
**CY1HT25, 32**




**CY1HT$^{25}_{32}$-□B**

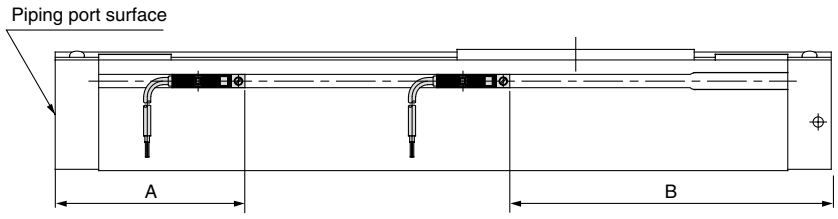



(mm)

| Model | A | EA | EB | H | HA | HB | HC | HG | HP | HT | J | LL | LW | M | MM | N | NL | NT | PA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CY1HT25** | 125 | 28.5 | 79 | 63 | 46 | 46 | 61.5 | 19.5 | 58.5 | 35 | M6 | 56 | 119 | M6 | 10 | 20.5 | 18 | 9 | 65 |
| **CY1HT32** | 132.5 | 30 | 90 | 75 | 52.5 | 57.5 | 72.5 | 25 | 69.5 | 43 | M8 | 63.5 | 130 | M8 | 12 | 23 | 22.5 | 12 | 66 |

| Model | PB | PP | PS | S | TW | W | XA | XB | Z |
|---|---|---|---|---|---|---|---|---|---|
| **CY1HT25** | 108 | 18 | 51 | 209 | 110 | 136 | 11.3 | 9.5 | 250 |
| **CY1HT32** | 115 | 14 | 61 | 219 | 124 | 150 | 9.7 | 2 | 265 |

## Auto Switch Proper Mounting Position for Stroke End Detection




### Auto Switch Mounting Position

| Auto switch model / Cylinder model | A | | | B | | |
|---|---|---|---|---|---|---|
| | D-Z7□ D-Z80 | D-Y7□W D-Y7□WV | D-Y5□ D-Y6□ D-Y7P D-Y7PV | D-Z7□ D-Z80 | D-Y7□W D-Y7□WV | D-Y5□ D-Y6□ D-Y7P D-Y7PV |
| **CY1H10** | 65.5 | 65.5 | 65.5 | 59.5 | 59.5 | 59.5 |
| **CY1H15** | 72 | 72 | 72 | 122 | 122 | 122 |
| **CY1H20** | 77.5 | 77.5 | 77.5 | 127.5 | 127.5 | 127.5 |
| **CY1H25** | 86 | 86 | 86 | 164 | 164 | 164 |
| **CY1HT25** | 86 | 86 | 86 | 164 | 164 | 164 |
| **CY1HT32** | 82 | 82 | 82 | 183 | 183 | 183 |

Note) 50mm is the minimum stroke available with 2 auto switches mounted.
In case of a stroke less than this, contact SMC.

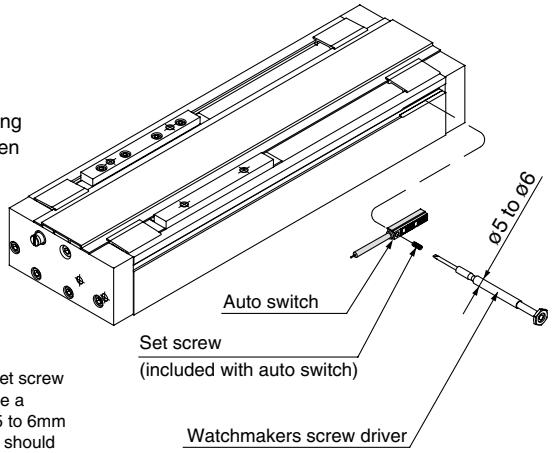
## Auto Switch Operating Range

| Auto switch model / Cylinder model | D-Z7□ D-Z80 | D-Y7□W D-Y7□WV D-Y5□ D-Y6□ D-Y7P D-Y7PV |
|---|---|---|
| **CY1H10** | 8 | 6 |
| **CY1H15** | 6 | 5 |
| **CY1H20** | 6 | 5 |
| **CY1H25** | 6 | 5 |
| **CY1HT25** | 6 | 5 |
| **CY1HT32** | 9 | 6 |

Note) Operating ranges are standards including hysteresis, and are not guaranteed. Large variations may occur depending on the surrounding environment.
(variations on the order of ±30%)

## Auto Switch Mounting

When mounting auto switches, they should be inserted into the cylinder's switch groove from the direction shown in the drawing on the right. After setting in the mounting position, use a screw driver to tighten the set screw which is included.




Note) When tightening the auto switch set screw (included with the auto switch), use a screw driver with a handle about 5 to 6mm in diameter. The tightening torque should be approximately 0.05 to 0.1 Nm.

## Auto Switch Lead Wire Containment Groove

On models CY1H20 and CY1H25 a groove is provided on the side of the body (one side only) to contain auto switch lead wires. This should be used for management of wiring.